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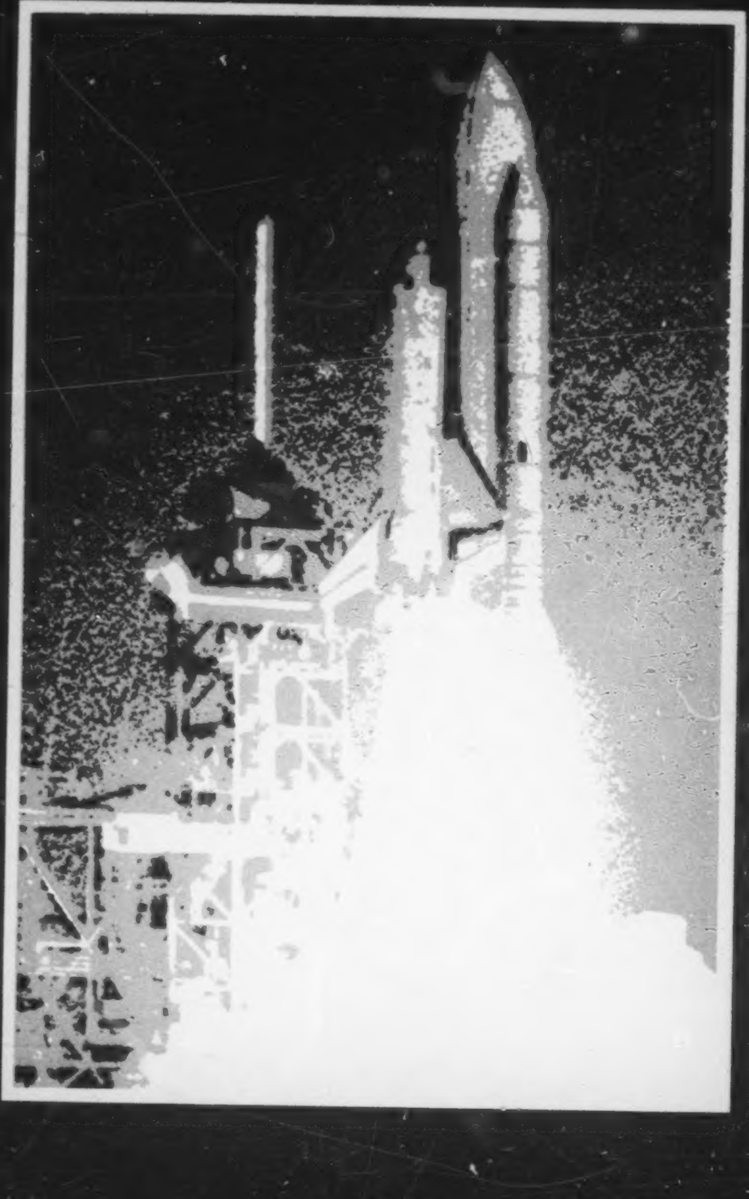
Aerospace Facts and Figures 1982/83



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6 Foreword

8 Aerospace Summary

29 Aircraft Production

48 Missile Programs

58 Space Programs

77 Air Transportation

95 Helicopter Transportation

104 Research and Development

116 Foreign Trade

130 Employment

142 Finance

153 Glossary

160 Index

For the U.S. aerospace industry, 1981 was a curiously paradoxical year. From the standpoint of sales, it was the best year in history—even after inflation is taken into account. But in certain statistical categories, there was evidence of disquieting trends, declines in activity or zero growth patterns one would not expect to see in a record-setting year.

The industry's sales picture is best outlined by removing the distorting inflation factor, i.e., by converting the data to constant dollars. In constant dollar terms, 1981 marked the fifth consecutive year of sales growth and total sales exceeded those of the previous peak year (1968) by more than four percent. For 1981, there was real sales growth in every major product group except one—civil aircraft. The decline in civil aircraft sales growth is paramount among the disquieting trends mentioned earlier.

The industry's profit rate on sales remained at about four percent for the fifth straight year. That compares with an average of well below three percent for the prior decade. Aerospace profit is still below the average for all U.S. manufacturing industries, but the general improvement in earnings is encouraging to an industry having capital investment needs of such a high order.

In 1981, the industry once again made a major contribution to the overall U.S. economy by setting new records for export sales and net trade balance. The importance to the economy of high-value, high-technology aerospace exports is underlined by this fact: in the last five years, when the U.S. as a whole experienced annual trade deficits totaling $145 billion, the adverse impact was softened by an offsetting aerospace trade surplus of more than $51 billion.

Among the troubling statistics for 1981 is the fact that the industry's backlog of orders declined in real, inflation-adjusted terms after five years of solid gain during which the backlog increased by more than 80 percent. The major reason was a lull in orders of civil aircraft, occasioned by foreign competition, the recession, high interest rates and the depressed financial status of many of the world's airlines. The backlog of civil jetliners, which had grown in big jumps for several years, declined by some $3.6 billion dollars. And that doesn't tell the whole story because the statistics cited are for 1981; continuing airline financial distress has brought a number of cancellations of transport orders in 1982.

Despite the peak levels attained in 1981, international trade is another area of concern; while we were exporting more aerospace products than ever, we were also importing aerospace products at a record pace. Another factor in the international trade picture was a sharp reduction in the backlog of orders from foreign airlines, a drop in value of more than one-third in 1981. That is an especially disturbing note, because jetliner sales to foreign customers have for many years constituted not only the major element of the aerospace export volume but also the primary dollar-value component of the industry's overall civil aircraft production.

Thus, the immediate future outlook is dim for the civil aircraft manufacturing segment of the industry, due to the combined effects of the recession and the still-increasing competition from foreign manufacturers. But projections of the world civil aircraft market for the coming decade remain high; the need for new and replacement aircraft has not diminished, only the customers' ability to buy. Given an economic upturn and improvement in the airlines' financial health, civil aircraft production could rise well beyond current levels in the latter half of the decade.

There is a brighter outlook in the other major areas of industry effort. The Administration's defense buildup is moving into high gear and projections indicate considerably expanded industry activity in aircraft and missile research, development and production.

Similarly, the industry's sales of space systems are increasing steadily, due largely to a rapidly growing military space program. Space funding for the Department of Defense is now greater than for NASA. Budget plans contemplate substantial growth in combined DOD/NASA outlays, suggesting broadened industry workload in development and fabrication of space equipment.

The story of the aerospace industry in 1981 is further chronicled in this 30th edition of *Aerospace Facts and Figures,* a significantly improved version that has been comprehensively revised to enhance statistical precision and to reflect more accurately the changing character of the aerospace industry. We trust this useful and informative volume will meet the wide acceptance enjoyed by its predecessors.

Karl G. Harr, Jr.
President
Aerospace Industries
Association

The aerospace industry's 1981 sales volume was the best in history, with real (inflation-adjusted) gains in most categories and an overall real increase of about 10 percent. There were, however, some disquieting notes. In production of civil aircraft, sales increased in current dollars but declined—for the first time in four years—in real terms. And the industry's backlog showed zero real growth after five years of impressive gains.

Here is a breakdown of the industry's 1981 peformance:

Sales. Total sales amounted to $63.5 billion, up $10.6 billion, or 20 percent above the 1980 level. Half of the increase—$5.4 billion—was in sales of military aircraft; there were also appreciable increases in the missiles, space and non-aerospace categories. Considered in inflation-adjusted constant dollars, the 1981 sales volume topped the previous peak (1968) by more than four percent.

Aerospace industry sales represented 2.2 percent of the Gross National Product and 3.2 percent of total sales by all U.S. manufacturing industries; both figures were the highest in a decade.

Profit. The industry's net profit after taxes amounted to $2.9 billion, or 4.3 percent of net sales; the latter figure exactly matched that of the previous year. The aerospace profit edged closer to, but remained below, the average for all U.S. manufacturing corporations, which was 4.7 percent in 1981.

Backlog. The aerospace backlog increased by a substantial $8.2 billion, but the rate of increase was far below the dramatic gains of the three prior years; converted to constant dollars, the backlog was almost exactly the same as last year's. At year-end 1981, orders on the books amounted to just under $99 billion in current dollars, including $45.8 billion in orders from the U.S government and $52.9 billion in work for other customers.

As is traditional, orders for aircraft—including engines and parts —constituted the principal element of the backlog—$62.1 billion or 63 percent of the total. The major backlog increases were in U.S. government aircraft—largely military aircraft and related R&D—and in "other aerospace," a category that embraces conversions, modifications, ground support equipment and certain R&D contracts. There was a moderate increase in missile/space backlog and slight declines were recorded in the non-aerospace category and in aircraft orders from customers other than the U.S. government.

Civil Aircraft Production. In 1981, the industry shipped 10,916 civil aircraft, more than 2,700 units below the 1980 figures; it was the third consecutive year of decline in terms of numbers and the lowest level of shipments since 1972. Despite the decline, total dollar value of shipments continued to increase, but only slightly, from $13.1 billion in 1980 to $13.2 billion in 1981. The latter figure does not include spare parts or payments for R&D work and other services related to civil aircraft manufacture; the grand total was $17.4 billion.

As is customary, the bulk of the dollar value was in sales of commercial transports—$9.7 billion, or $200 million less than in 1980. The industry delivered 387 transports, the same as in 1980; 255 of them went to foreign customers (up from 237) and 132 to U.S. buyers (down from 150). Backlog for transports dropped sharply, from $20.8 billion in 1980 to $17.2 billion at the end of 1981. Of special note was the fact that orders from foreign airlines, which traditionally constitute more than half of the backlog, dropped by $4.5 billion, reducing the foreign backlog to less than 45 percent of the total.

The four-year pattern of increasing civil helicopter production was broken as shipments declined almost 300 units to a 1981 total of 1,072. The dollar value of sales also declined, from $656 million in 1980 to $597 million in 1981.

General aviation plane shipments totaled 9,457, down from 11,881 in the previous year. However, the value of shipments increased some $400 million to more than $2.9 billion, due to the fact that continuing strong production of higher-value jet and turboprop business aircraft more than offset reduced shipments of light single-engine aircraft; sales in the latter area have been most severely impacted by the economy, high interest rates and fuel costs.

Military Aircraft Production. In terms of numbers, the industry's output of military aircraft was approximately the same as in the previous year; 1,048 units, five fewer than in 1980. The total included 689 planes destined for use by U.S. armed services; the figure compares with 631 in 1980. The Department of Defense also accepted 215 aircraft for delivery to foreign governments under Foreign Military Sales or Military Assistance Programs. In addition, the industry sold 144 planes to foreign customers on a commercial basis, 84 fewer than in 1980. The value of DOD acceptances—904 aircraft compared with 825 in 1980—was $8.6 billion, up $2.1 billion. The grand total of all industry effort related to military aircraft—deliveries to DOD, commercial shipments, aircraft and engine spare parts and R&D contracts—was $19.2 billion, which compares with $13.9 billion in 1980.

Missile Programs. Industry sales of missile systems, including production and R&D work, amounted to $6.8 billion in 1981; this represented an increase of almost $800 million, or 12.7 percent. Sales of missile systems and parts, excluding R&D, totaled $4.7 billion, up 17 percent over the previous year. Backlog at year-end 1981 was $5.5 billion, same as in 1980.

Space Programs. Combined sales of civil and military space systems, including R&D programs, amounted to $9.5 billion in 1981, up more than 20 percent over 1980. The increase was due largely to rapidly growing military space activity, as evidenced in federal budget authority figures. For Fiscal Year 1981, NASA was authorized $5 billion and the Department of Defense $4.8 billion; in FY 1982, DOD funding ($5.9 billion) is greater than NASA's ($5.6 billion); for FY 1983, the Administration requested $8.5 billion for DOD, $6.6 billion for NASA.

Non-aerospace Sales. AIA estimates for sales of non-aerospace products and services by aerospace manufacturers continued their 10-year climb and reached a new peak of $10.6 billion, up from $8.8 billion in 1980. The 1981 figure represented almost 17 percent of total industry sales.

Research and Development. Expenditures for aerospace research and development in 1981 increased by some $200 million over 1980—but in real, inflation-adjusted terms declined by 6.7 percent. This compared with the all-industries gain of 3.5 percent. Aerospace R&D funding by government and industry amounted to $9.8 billion; aerospace placed second among U.S. industries in level of funding, behind the electrical machinery/communications equipment industry. However, estimates for 1982 indicate that aerospace R&D will increase about 25 percent to $12.2 billion and that aerospace will regain its top ranking.

Federal outlays for R&D, a general indicator of industry activity levels, are expected to increase in FY 1982. In areas primarily affecting the aerospace industry, R&D outlays for the Department of Defense are estimated at $18.8 billion (up more than 19 percent) and for NASA at $5.7 billion (up 7.9 percent). A further 21 percent increase in DOD funding—to $22.7 billion—is projected for FY 1983; NASA funding for FY 1983 is estimated at $6.5 billion, up more than 13 percent over 1982.

Foreign Trade. In a year when the U.S. experienced another large international trade deficit, the aerospace industry once again demonstrated the importance to the U.S economy of high-value, high-technology aerospace exports. The industry set new records for exports and trade balance, thereby offsetting U.S. deficits in other areas of international trade. Exports totaled $17.6 billion and the aerospace trade balance was $13.1 billion; the figures compare with exports of $15.5 billion and a trade balance of $12 billion in 1980.

Within the generally bright foreign trade picture, however, there were some negative aspects, among them the lack of growth in civil exports, which at $13.3 billion barely topped 1980's $13.2 billion. As in previous years, sales of commercial transport aircraft constituted the greatest dollar value among civil exports—$7.2 billion, up from $6.7 billion. However, the major growth was in military exports, which increased by more than 91 percent to $4.3 billion.

Another matter of industry concern was the continuing growth of aerospace imports, reflecting further penetration of the U.S. civil aviation market by foreign manufacturers. Imports amounted to $4.5 billion, a record level almost $1 billion higher than the previous peak (1980).

Employment. Declining activity in civil aircraft production brought about a 1981 drop of some 50,000 workers in that segment of the industry, a drop minimized by employment gains in military and space work. The industry's total labor force at year-end 1981 numbered 1,203,000 down from 1,218,000 at the end of 1980.

However, computed on an annual average basis, industry employment in 1981 was 1,207,000, compared with 1,187,000 in the previous year. Thus, the upward annual average trend in evidence since 1977 continued, but at a sharply lower rate of gain. The largest employment gain was in missiles and space activity—9,000 workers. Despite the decline in civil aircraft production, the overall aircraft manufacturing work force increased by 2,000 workers.

A comparison of year-end figures indicates that the number of production workers declined for the first time in several years, down 5.6 percent to 578,000; there was a slight dip in the number of scientists and engineers, and a 7.7 percent increase in technicians. As in previous years, most production workers—377,000 or 65 percent of the total—were engaged in manufacture of aircraft and related equipment. Their hourly earnings averaged $10.31, up 11 percent over the previous year; average weekly earnings rose from $390 to $426.

An AIA survey indicated that the total labor force will increase to 1,220,000 by the end of 1982 and continue the upward trend to 1,269,000 employees by year-end 1983.

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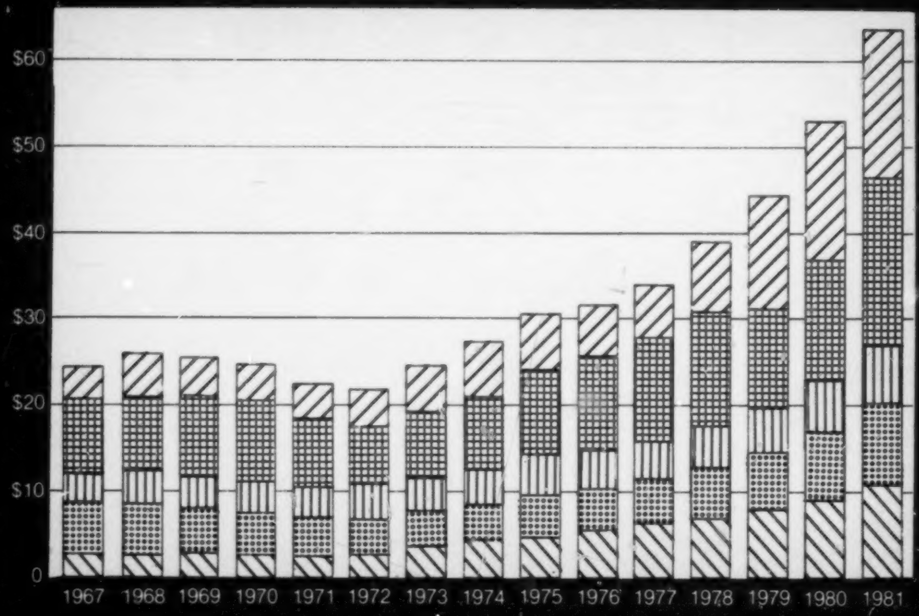
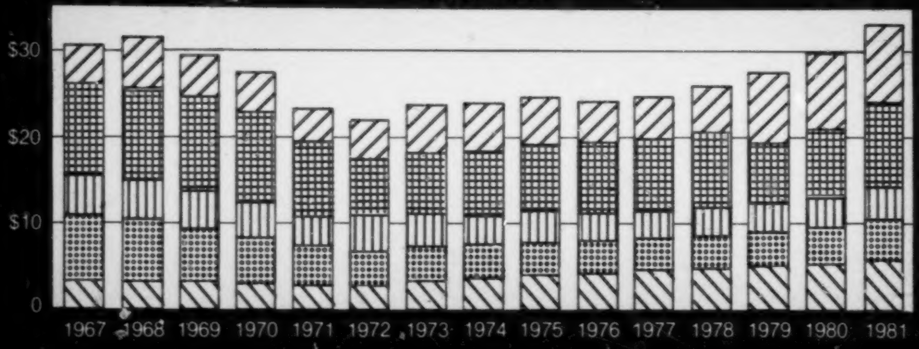
AEROSPACE INDUSTRY SALES BY PRODUCT GROUP

(Billions of Current Dollars)



(Billions of Constant Dollars)
1972 = 100



▨ CIVIL AIRCRAFT ▦ MILITARY AIRCRAFT ▥ MISSILES

▦ SPACE ▧ NON-AEROSPACE

Source: AIA

AEROSPACE INDUSTRY SALES BY PRODUCT GROUP[r]

Calendar Years 1967-1981
(Millions of Dollars)

Year	TOTAL SALES	Aircraft			Missiles	Space	Non-Aerospace[a]
		Total	Civil	Military			
CURRENT DOLLARS							
1967	$24,130	$12,161	$ 3,562	$ 8,599	$3,388	$6,001	$ 2,580
1968	25,927	13,756	5,025	8,731	3,651	5,971	2,549
1969	25,278	13,660	4,267	9,393	3,624	5,295	2,699
1970	24,924	13,899	4,382	9,517	3,656	4,725	2,644
1971	22,064	11,897	3,764	8,133	3,283	4,361	2,523
1972	21,512	10,750	4,181	6,569	3,953	4,163	2,646
1973	24,744	13,376	5,742	7,634	3,899	4,126	3,343
1974	27,145	14,761	6,320	8,441	3,905	4,412	4,067
1975	30,356	16,350	6,463	9,887	4,528	4,686	4,792
1976	31,528	16,988	6,007	10,981	4,442	4,787	5,311
1977	33,854	18,312	6,183	12,129	4,437	5,001	6,104
1978	38,939	21,617	8,222	13,395	4,792	5,717	6,813
1979	44,210	24,659	13,227	11,432	5,291	6,545	7,715
1980	52,896	30,144	16,285	13,859	6,041	7,892	8,819
1981	63,490	36,625	17,392	19,233	6,807	9,472	10,586
CONSTANT DOLLARS (1972 = 100)							
1967	$30,521	$15,382	$ 4,505	$10,877	$4,285	$7,590	$3,263
1968	31,411	16,666	6,088	10,578	4,423	7,234	3,088
1969	29,125	15,739	4,916	10,823	4,176	6,101	3,110
1970	27,254	15,198	4,792	10,407	3,998	5,167	2,891
1971	22,981	12,391	3,920	8,471	3,419	4,542	2,628
1972	21,512	10,750	4,181	6,569	3,953	4,163	2,646
1973	23,412	12,656	5,433	7,223	3,689	3,904	3,163
1974	23,621	12,845	5,499	7,345	3,398	3,839	3,539
1975	24,176	13,022	5,147	7,874	3,606	3,732	3,817
1976	23,865	12,859	4,547	8,312	3,362	3,623	4,020
1977	24,211	13,096	4,422	8,674	3,173	3,576	4,365
1978	25,951	14,407	5,480	8,927	3,194	3,810	4,540
1979	27,161	15,150	8,126	7,023	3,251	4,021	4,740
1980	29,824	16,996	9,182	7,814	3,406	4,450	4,972
1981	32,776	18,907	8,978	9,929	3,514	4,890	5,465

Source: Aerospace Industries Association.
NOTE: See Glossary for explanation of "Aerospace Sales."

[a] Products and services other than aircraft, missiles, and space vehicles and parts, produced by establishments whose principal business is the development and/or manufacture of aerospace products.

[r] A comprehensive revision of the AIA aerospace industry sales series for 1967-1980 was completed in 1982 in order to incorporate different data sources selected to better reflect the evolving composition of the aerospace industry.

AEROSPACE INDUSTRY SALES BY CUSTOMER[r]

Calendar Years 1967-1981
(Millions of Dollars)

Year	TOTAL SALES	Aerospace Products and Services			Non-Aerospace[a]	
		U.S. Government				
		Dept. of Defense	NASA and Other Agencies	Other Customers[b]	U.S. Gov't.	Other Customers
CURRENT DOLLARS						
1967	$24,130	$12,901	$4,219	$ 4,430	$1,750	$ 830
1968	25,927	13,609	3,978	5,791	1,568	981
1969	25,278	13,832	3,369	5,378	1,633	1,066
1970	24,924	14,011	3,000	5,269	1,465	1,179
1971	22,064	11,877	2,779	4,885	1,372	1,151
1972	21,512	11,195	2,649	5,022	1,546	1,100
1973	24,744	11,846	2,459	7,096	1,925	1,418
1974	27,145	12,329	2,608	8,141	2,060	2,007
1975	30,356	13,795	2,838	8,931	2,496	2,296
1976	31,528	15,106	2,938	8,173	2,879	2,432
1977	33,854	16,023	3,012	8,715	3,625	2,479
1978	38,939	16,770	3,151	12,205	3,860	2,953
1979	44,210	17,708	3,453	15,334	4,087	3,628
1980	52,896	20,994	4,106	18,977	4,762	4,057
1981	63,490	25,896	4,688	22,320	5,822	4,764
CONSTANT DOLLARS (1972 = 100)						
1967	$30,521	$16,318	$5,336	$ 5,603	$2,214	$1,050
1968	31,411	16,488	4,819	7,016	1,900	1,189
1969	29,125	15,937	3,882	6,197	1,882	1,228
1970	27,254	15,321	3,280	5,762	1,602	1,289
1971	22,981	12,371	2,894	5,088	1,429	1,199
1972	21,512	11,195	2,649	5,022	1,546	1,100
1973	23,412	11,208	2,327	6,714	1,821	1,342
1974	23,621	10,728	2,269	7,084	1,793	1,746
1975	24,176	10,987	2,260	7,113	1,988	1,829
1976	23,865	11,434	2,224	6,187	2,179	1,841
1977	24,211	11,459	2,154	6,233	2,592	1,773
1978	25,951	11,176	2,100	8,134	2,572	1,968
1979	27,161	10,879	2,121	9,421	2,511	2,229
1980	29,824	11,837	2,315	10,700	2,685	2,287
1981	32,776	13,368	2,420	11,522	3,006	2,459

Source: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Sales."

[a] Products and services other than aircraft, missiles, and space vehicles and parts, produced by establishments whose principal business is the development and/or manufacture of aerospace products.

[b] All civil sales of aircraft (domestic and export), commercial space sales, and all military aircraft and missile exports, including both commercial (manufacture-to-foreign government) and Foreign Military Sales (FMS)/Military Assistance Programs (MAP).

[r] A comprehensive revision of the AIA aerospace industry sales series for 1967-1980 was completed in 1982 in order to incorporate different data sources selected to better reflect the evolving composition of the aerospace industry.

SALES OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

Calendar Years 1968-1981

(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, and Parts		Missiles & Space Incl. Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't.	Other	U.S. Gov't.	Other		U.S. Gov't.	Other	
CURRENT DOLLARS									
1968	$25,592	$16,635	$ 8,957	$ 7,411	$ 6,439	$6,076	$2,077	$1,040	$ 2,549
1969	24,648	16,560	8,088	7,161	5,603	5,660	2,539	986	2,699
1970	24,752	16,407	8,345	7,586	5,880	5,422	2,324	896	2,644
1971	21,679	14,114	7,565	6,313	5,079	4,971	1,909	884	2,523
1972	21,499	13,492	8,007	4,954	5,199	5,598	2,067	1,035	2,646
1973	24,305	14,431	9,874	5,539	6,739	5,580	2,103	1,001	3,343
1974	26,849	15,196	11,653	5,982	7,560	5,854	2,101	1,285	4,067
1975	29,473	17,314	12,159	6,859	7,797	6,310	2,070	1,645	4,792
1976	31,328	19,083	12,245	8,314	7,622	5,880	2,368	1,833	5,311
1977	33,315	20,704	12,611	8,848	7,530	5,775	2,839	2,219	6,104
1978	37,968	21,888	16,080	8,724	10,581	6,380[a]	3,363	2,107[a]	6,813
1979	46,173	23,229	22,944	8,649	16,023	7,197	3,930	2,659	7,715
1980[r]	58,440	26,674	31,766	9,427	20,097	8,393	6,869	2,609	11,045
1981[b]	70,536	32,504	38,032	12,168	22,527	9,842	8,170	3,120	14,709
CONSTANT DOLLARS (1972 = 100)[c]									
1968	$31,006	$20,154	$10,852	$8,979	$ 7,801	$7,361	$2,516	$1,260	$3,088
1969	28,400	19,081	9,319	8,251	6,456	6,521	2,925	1,136	3,110
1970	27,066	17,941	9,125	8,295	6,430	5,929	2,541	980	2,891
1971	22,580	14,701	7,879	6,575	5,290	5,178	1,988	921	2,628
1972	21,499	13,492	8,007	4,954	5,199	5,598	2,067	1,035	2,646
1973	22,996	13,654	9,342	5,241	6,376	5,280	1,990	947	3,163
1974	23,363	13,223	10,140	5,205	6,578	5,094	1,828	1,118	3,539
1975	23,473	13,789	9,684	5,463	6,210	5,025	1,649	1,310	3,817
1976	23,714	14,445	9,269	6,293	5,769	4,451	1,792	1,388	4,020
1977	23,825	14,807	9,019	6,328	5,385	4,130	2,030	1,587	4,365
1978	25,304	14,587	10,716	5,814	7,052	4,252	2,241	1,404	4,540
1979	28,367	14,271	14,096	5,314	9,844	4,422	2,414	1,634	4,740
1980	32,950	15,039	17,910	5,315	11,331	4,732	3,873	1,471	6,227
1981	36,413	16,780	19,633	6,282	11,629	5,081	4,218	1,611	7,593

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] AIA estimate based on MQ37D data.

[b] The Bureau of the Census has issued a downward revision for first and second quarter data by a total of $1,947 million, such that the restated level of 1981 annual sales amounts to $68,589. Product group detail is not yet available for the revised totals.

[c] Based on GNP implicit price deflator.

[r] Revised.

BACKLOG OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

As of December 31, 1968-1981
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, and Parts		Missiles & Space Incl. Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't.	Other	U.S. Gov't.	Other		U.S. Gov't.	Other	
CURRENT DOLLARS									
1968	$30,749	$16,343	$14,406	$ 8,150	$12,409	$5,083	$1,851	$ 983	$2,273
1969	28,297	14,298	13,999	7,089	12,099	4,338	2,001	880	1,890
1970	24,705	12,882	11,823	5,913	9,800	4,522	1,986	805	1,679
1971	24,579	13,997	10,582	6,221	8,059	4,780	2,232	1,042	2,245
1972	26,922	15,322	11,600	7,027	8,605	5,272	2,018	972	3,028
1973	29,661	16,695	12,966	7,815	8,550	5,670	1,819	1,078	4,729
1974	35,516	20,889	14,627	9,789	9,602	6,643	1,926	1,665	5,891
1975	35,038	22,168	12,870	10,751	8,141	6,415	1,983	2,088	5,660
1976	39,702	24,141	15,561	11,950	8,929	6,286	2,046	3,496	6,995
1977	45,309	26,119	19,190	12,471	12,592	6,743	2,761	3,447	7,295
1978	57,160	30,223	26,937	14,897	18,972	7,557	4,029	3,668	8,037
1979	78,259	36,136	42,123	17,316	33,168	7,388	5,613	5,112	9,662
1980[r]	90,517	37,200	53,317	17,514	41,267	8,572	8,564	4,447	10,153
1981	98,742	45,821	52,921	21,017	41,119	9,016	12,916	4,640	10,034
CONSTANT DOLLARS (1972 = 100)[a]									
1968	$37,253	$19,800	$17,453	$9,874	$15,034	$6,158	$2,243	$1,191	$2,754
1969	32,604	16,474	16,130	8,168	13,941	4,998	2,306	1,014	2,178
1970	27,015	14,086	12,928	6,466	10,716	4,945	2,172	880	1,836
1971	25,600	14,579	11,022	6,480	8,394	4,979	2,325	1,085	2,338
1972	26,922	15,322	11,600	7,027	8,605	5,272	2,018	972	3,028
1973	28,064	15,796	12,268	7,394	8,090	5,365	1,721	1,020	4,474
1974	30,905	18,177	12,728	8,518	8,355	5,781	1,676	1,449	5,126
1975	27,905	17,655	10,250	8,562	6,484	5,109	1,579	1,663	4,508
1976	30,052	18,273	11,779	9,045	6,759	4,758	1,549	2,646	5,295
1977	32,403	18,679	13,724	8,919	9,005	4,822	1,975	2,465	5,217
1978	38,094	20,142	17,952	9,928	12,644	5,036	2,685	2,445	5,356
1979	48,079	22,201	25,879	10,638	20,377	4,539	3,448	3,141	5,936
1980	51,036	20,974	30,061	9,875	23,267	4,833	4,829	2,507	5,725
1981	50,974	23,654	27,320	10,850	21,227	4,654	6,668	2,395	5,180

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] Based on GNP implicit price deflator.

[r] Revised.

AEROSPACE SALES AND THE NATIONAL ECONOMY

Calendar Years 1967-1981
(Billions of Dollars)

Year	Gross National Product	Sales			Aerospace Sales As Percent of		
		Manufacturing Industries	Durable Goods Industries	Aerospace Industry[a]	GNP	Manufacturing Industries	Durable Goods Industries
CURRENT DOLLARS							
1967	$ 799.6	$ 557.8	$ 303.2	$ 24.1	3.0%	4.3%	7.9%
1968	873.4	603.2	332.4	25.9	3.0	4.3	7.8
1969	944.0	642.5	353.7	25.3	2.7	3.9	7.2
1970	992.7	633.7	338.6	24.9	2.5	3.9	7.4
1971	1,077.6	671.1	359.7	22.1	2.1	3.3	6.1
1972	1,185.9	756.5	408.5	21.5	1.8	2.8	5.3
1973	1,326.4	875.4	476.4	24.7	1.9	2.8	5.2
1974	1,434.2	1,017.9	531.0	27.1	1.9	2.7	5.1
1975	1,549.2	1,039.4	524.1	30.4	2.0	2.9	5.8
1976	1,718.0	1,185.7	608.4	31.5	1.8	2.7	5.2
1977	1,918.0	1,330.1	696.1	33.9	1.8	2.5	4.9
1978	2,156.1	1,496.6	798.1	38.9	1.8	2.6	4.9
1979	2,413.9	1,727.3[r]	909.6[r]	44.2	1.8	2.6	4.9
1980	2,626.1	1,845.9[r]	936.0[r]	52.9	2.0	2.9	5.7
1981	2,925.5	1,997.8	1,019.9	63.5	2.2	3.2	6.2

CONSTANT DOLLARS (1972 = 100)					**GNP Implicit Price Deflator 1972 = 100**
1967	$1,011.4	$ 705.5	$ 383.5	$ 30.5	79.06
1968	1,058.1	730.8	402.7	31.4	82.54
1969	1,087.6	740.3	407.5	29.1	86.79
1970	1,085.6	692.9	370.3	27.3	91.45
1971	1,122.4	699.0	374.6	23.0	96.01
1972	1,185.9	756.5	408.5	21.5	100.00
1973	1,255.0	828.3	450.8	23.4	105.69
1974	1,248.0	885.7	462.1	23.6	114.92
1975	1,233.9	827.8	417.4	24.2	125.56
1976	1,300.4	897.5	460.5	23.9	132.11
1977	1,371.7	951.2	497.8	24.2	139.83
1978	1,436.9	997.4	531.9	26.0	150.05
1979	1,483.0	1,061.2	558.8	27.2	162.77
1980	1,480.7	1,040.8	527.7	29.8	177.36
1981	1,510.3	1,031.3	526.5	32.8	193.71

Source: Gross National Product and GNP Implicit Price Deflator: "Economic Report of the President" (Annually) and "Survey of Current Business" (Monthly). Sales of Manufacturing and Durable Goods Industries: "Survey of Current Business" (Monthly). Aerospace Sales: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Sales."

[a] A comprehensive revision of the AIA aerospace industry sales series for 1967-1980 was completed in 1982 in order to incorporate different data sources selected to better reflect the evolving composition of the aerospace industry.

[r] Revised.

ANNUAL AVERAGE EMPLOYMENT AEROSPACE INDUSTRY AND ALL MANUFACTURING INDUSTRIES

Calendar Years 1961-1981
(Thousands of Employees)

Year	All Manufacturing Industries TOTAL	Aerospace			Aerospace As Percent of All Manufacturing
		TOTAL	Production Workers	Other	
1961	16,326	1,178	612	566	7.2%
1962	16,853	1,270	635	635	7.5
1963	16,995	1,267	625	642	7.5
1964	17,274	1,209	600	609	7.0
1965	18,062	1,175	597	578	6.5
1966	19,214	1,375	731	644	7.2
1967	19,447	1,484	804	680	7.6
1968	19,781	1,502	807	695	7.6
1969	20,167	1,402	746	656	7.0
1970	19,367[r]	1,166	604	562	6.0
1971	18,623[r]	951	480	471	5.1
1972	19,151	912	455	457	4.8
1973	20,154	956	482	474	4.7
1974	20,077	982	494	488	4.9
1975	18,323	941	461	480	5.1
1976	18,997	896	433	463	4.7
1977	19,682	893	429	464	4.5
1978	20,505	977	476	501	4.8
1979	21,040[r]	1,109[r]	562[r]	547[r]	5.3
1980	20,300[r]	1,187[r]	598[r]	589[r]	5.8
1981	20,261	1,207	593	614	6.0

Source: Manufacturing Employment from Bureau of Labor Statistics, "Employment and Earnings," (Monthly); Aerospace Employment from Aerospace Industries Association estimates, based on "Employment and Earnings," Bureau of Labor Statistics.

[a] "Other" employment includes salaried, clerical and maintenance employees, among others.

[r] Revised.

ANNUAL PAYROLL
AEROSPACE INDUSTRY AND ALL MANUFACTURING INDUSTRIES

Calendar Years 1961-1981
(Millions of Dollars)

Year	All Manufacturing Industries TOTAL	Aerospace[a]			Aerospace As Percent of All Manufacturing
		TOTAL	Production Workers	Other	
1961	$ 89,800	$ 9,140	$ 4,342	$ 4,798	10.2%
1962	96,700	10,232	4,871	5,361	10.6
1963	100,600	10,173	4,588	5,585	10.1
1964	107,100	10,067	4,563	5,504	9.4
1965	115,500	10,188	4,504	5,684	8.8
1966	128,000	12,139	5,641	6,498	9.5
1967	134,100	13,727	6,382	7,345	10.2
1968	145,800	14,397	6,582	7,815	9.9
1969	157,500	14,649	6,401	8,248	9.3
1970	158,200	12,275	5,322	6,953	7.8
1971	160,300	10,480	4,409	6,071	6.5
1972	175,400	10,504	4,280	6,224	6.0
1973	196,200	12,107	5,087	7,020	6.2
1974	211,400	13,535	5,672	7,863	6.4
1975	211,000	14,608	5,935	8,673	6.9
1976	237,400	14,881	5,951	8,930	6.3
1977	266,000	16,276	6,464	9,812	6.1
1978	299,200	19,501	7,873	11,628	6.5
1979	333,400	24,243[r]	10,247[r]	13,996[r]	7.3
1980	350,700	28,795[r]	12,087[r]	16,708[r]	8.2
1981	387,300	32,105	13,088	19,017	8.3

Source: Manufacturing Payroll from Bureau of Economic Analysis, "Survey of Current Business;" Aerospace Payroll from Aerospace Industries Association estimates.

[a] Based on AIA estimates of annual average employment and earnings for the aerospace industry; derived from BLS data (see Glossary, "Aerospace Employment" and "Aerospace Payroll").

[r] Revised.

ANNUAL AVERAGE EMPLOYMENT IN ALL MANUFACTURING, DURABLE GOODS AND AEROSPACE INDUSTRIES

Calendar Years 1961-1981

(Thousands of Employees)

Year	All Manufacturing Industries	Durable Goods Industries	Aerospace Industry		
			TOTAL	As Percent of	
				All Manufacturing	Durable Goods
1961	16,326	9,070	1,178	7.2%	13.0%
1962	16,853	9,480	1,270	7.5	13.4
1963	16,995	9,616	1,267	7.5	13.2
1964	17,274	9,816	1,209	7.0	12.3
1965	18,062	10,405[r]	1,175	6.5	11.3
1966	19,214	11,282[r]	1,375	7.2	12.2
1967	19,447	11,439	1,484	7.6	13.0
1968	19,781	11,626	1,502	7.6	12.9
1969	20,167	11,895	1,402	7.0	11.8
1970	19,367[r]	11,208[r]	1,166	6.0	10.4
1971	18,623[r]	10,636[r]	951	5.1	8.9[r]
1972	19,151	11,049	912	4.8	8.3
1973	20,154	11,891	956	4.7	8.0
1974	20,077	11,925	982	4.9	8.2
1975	18,323	10,688	941	5.1	8.8
1976	18,997	11,077	896	4.7	8.1
1977	19,682	11,597	893	4.5	7.7
1978	20,505	12,274	977	4.8	8.0
1979	21,040[r]	12,760[r]	1,109[r]	5.3	8.7
1980	20,300[r]	12,181[r]	1,187[r]	5.8	9.7
1981	20,261	12,136	1,207	6.0	9.9

Source: Manufacturing and Durable Goods Employment from Bureau of Labor Statistics, "Employment and Earnings" (Monthly); Aerospace Employment from Aerospace Industries Association estimates based on "Employment and Earnings," Bureau of Labor Statistics.

NOTE: For explanation of "Aerospace Employment," see the Glossary.

[r] Revised.

U.S. TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

Calendar Years 1977-1981

	1977	1978	1979	1980	1981
TOTAL AIRCRAFT IN SERVICE	7,298	7,550	7,787	8,010	8,726
Number Manufactured in U.S. . .	5,027	5,159	5,341	5,590	5,900
Percent Manufactured in U.S. . .	68.9%	68.3%	68.6%	69.8%	67.6%
Turbojet Aircraft in Service	5,137	5,288	5,534	5,756	6,085
Number Manufactured in U.S.	4,345	4,467	4,671	4,916	5,188
Percent Manufactured in U.S.	84.6%	84.5%	84.4%	85.4%	85.3%
Turboprop Aircraft in Service . .	1,856	1,931	2,013	2,059	2,508
Number Manufactured in U.S.	429	422	477	515	638
Percent Manufactured in U.S.	23.1%	21.9%	23.7%	25.0%	25.4%
Turbine-Powered Helicopters in Service	305	331	240	195	133
Number Manufactured in U.S.	253	270	193	159	74
Percent Manufactured in U.S.	83.0%	81.6%	80.4%	81.5%	55.6%

Source: Exxon International Company, "Air World Survey," (Annually).

NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and includes aircraft in service on June 30. Excludes air taxi operators. Effective 1979, excludes a number of companies operating smaller types of aircraft and not providing scheduled service.

U.S. EXPORTS AND EXPORTS OF AEROSPACE PRODUCTS

Calendar Years 1960-1981
(Millions of Dollars)

Year	TOTAL Exports[a] of U.S. Merchandise	Exports of Aerospace Products				
		TOTAL	Percent of Total U.S. Exports	Civil		Military
				Trans-ports	Other	
1960	$ 20,375	$ 1,726	8.5%	$ 480	$ 609	$ 637
1961	20,754	1,653	8.0	263	615	775
1962	20,431	1,923	9.4	259	651	1,013
1963	23,062	1,627	7.1	191	541	895
1964	26,156	1,608	6.1	211	553	844
1965	27,127	1,618	6.0	353	501	764
1966	29,884	1,673	5.0	421	614	638
1967	31,142	2,248	7.2	611	769	868
1968	34,199	2,994	8.8	1,200	1,089	705
1969	37,462	3,138	8.4	947	1,080	1,111
1970	42,590	3,405	8.0	1,283	1,233	889
1971	43,492	4,203	9.7	1,567	1,513	1,123
1972	48,959	3,795	7.8	1,119	1,835	841
1973	70,246	5,142	7.3	1,664	2,124	1,354
1974	97,144	7,095	7.3	2,655	2,618	1,822
1975	106,561	7,792	7.3	2,397	2,927[r]	2,468
1976	113,666	7,843	6.9	2,468	3,209[r]	2,166
1977	119,006	7,581	6.4	1,936	3,113	2,532
1978	141,126	10,001	7.1	2,558	3,460	3,983
1979	178,591	11,747	6.6	4,998	4,774	1,975
1980	216,668[r]	15,506	7.2	6,727	6,521[r]	2,258[r]
1981	228,961	17,634	7.7	7,180	6,132	4,322

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually); "Highlights of U.S. Export and Import Trade," Report FT 990 (Monthly).

[a] Exports of domestic merchandise including DOD shipments.

[r] Revised.

GROSS NATIONAL PRODUCT, FEDERAL BUDGET AND DEFENSE BUDGET

Selected Fiscal Years
(Billions of Dollars)

Fiscal Year	GNP[r]	Federal Budget Outlays[r]			Defense Outlays[a] as Percent of	
		NET TOTAL[b]	Defense	Others	GNP[r]	Federal Budget[r]
1950—Lowest defense budget since World War II peak	$ 261.1	$ 43.1	$ 12.0	$ 31.1	4.6%	27.8%
1953—Korea peak	361.3	76.8	47.5	29.3	13.1	61.8
1964—Last prewar year	618.2	118.6	51.5	67.1	8.3	43.4
1968—South East Asia peak	831.3	178.1	78.8	99.3	9.5	44.2
1973—Actual	1,252.0	245.6	74.5	171.1	6.0	30.3
1974—Actual	1,379.4	267.9	77.8	190.1	5.6	29.0
1975—Actual	1,479.9	324.2	85.6	238.6	5.8	26.4
1976—Actual	1,640.1	364.5	89.4	275.1	5.5	24.5
1977—Actual	1,864.1	400.5	97.5	303.0	5.2	24.3
1978—Actual	2,083.8	448.4	105.2	343.2	5.0	23.5
1979—Actual	2,353.3	491.0	117.7	373.3	5.0	24.0
1980—Actual	2,567.5	576.7	135.9	440.8	5.3	23.6
1981—Actual	2,858.6	657.2	159.8	497.4	5.6	24.3
1982—Estimate	3,082.4	725.3	187.5	537.8	6.1	25.9
1983—Estimate	3,433.6	757.6	221.1	536.5	6.4	29.2

Source: "The Budget of the United States Government" (Annually).

[a] "Defense" includes the military budget of DOD and other defense-related activities.

[b] "Net Total" is government-wide total less intragovernmental transactions; excludes off-budget entities.

[r] Revised.

DEPARTMENT OF DEFENSE
TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE

Fiscal Years 1975-1983
(Millions of Dollars)

	1975	1976	Transition Quarter
TOTAL	$85,020	$88,036	$21,927
PROCUREMENT—TOTAL	16,042	15,964	3,766
AIRCRAFT	5,484	6,520	1,557
MISSILES	2,889	2,296	402
Ships	2,627	2,606	661
Combat Vehicles, Weapons & Torpedoes	395	240	134
Ordnance, Vehicles & Related Equipment	1,492	856	150
Electronics & Communications	897	1,031	271
Other Procurement	2,258	2,415	591
RESEARCH, DEVELOPMENT, TEST & EVALUATION—TOTAL	8,866	8,923	2,206
AIRCRAFT	1,698	1,603	410
MISSILES	2,176	2,295	520
ASTRONAUTICS	515	581	129
Other	4,477	4,444	1,147
Military Personnel—TOTAL	31,210	32,359	8,305
Active Forces	23,235	23,259	5,846
Reserve Forces	1,733	1,804	512
Retired Pay	6,242	7,296	1,947
Military Construction	1,462	2,019	376
Family Housing	1,124	1,192	296
Civil Defense	86	80	18
Operations and Maintenance	26,330	27,902	7,261
Other	(100)	(403)	(301)

Source: Department of Defense Budget (Annually).
NOTE: Data in parentheses are credit items. The categories printed in capital letters are primarily aerospace, but others contain substantial parts attributable to aerospace activities.
a Includes all items in the DOD military budget; excludes the DOD civil budget for the Army Corps of Engineers and other non-defense-related activities.
b Transferred to Federal Emergency Management Agency (FEMA) in 1979.
E Estimate.
NA Not Available.

DEPARTMENT OF DEFENSE
TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE[a] (Continued)

Fiscal Years 1975-1983
(Millions of Dollars)

1977	1978	1979	1980	1981	1982^{E}	1983^{E}
$95,650	$103,042	$115,013	$132,840	$156,096	$182,800	$215,900
18,178	19,976	25,404	29,021	35,191	41,325	55,144
6,608	6,971	8,836	11,124	13,193	15,767	21,746
2,781	1,794	2,084	2,461	3,513	4,437	6,262
2,841	3,048	4,553	4,222	5,217	5,414	6,295
833	2,140	2,949	3,222	4,145	4,941	6,462
940	732	958	1,271	1,368	1,525	2,005
1,197	1,349	1,618	6,721	7,755	9,241	12,374
2,978	3,942	4,406				
9,795	10,508	11,152	13,127	15,278	18,299	22,200
2,176	NA	NA	NA	NA	NA	NA
2,259						
537						
4,823						
33,931	36,246	38,686	42,761	50,138	53,284	61,005
23,857	25,116	26,300	28,465	33,378	34,839	40,054
1,858	1,959	2,107	2,376	3,031	3,445	4,480
8,216	9,171	10,279	11,920	13,729	15,000	16,471
1,914	1,932	2,080	2,450	2,463	2,744	3,975
1,358	1,405	1,468	1,680	1,721	2,138	2,436
93	82	(b)	(b)	(b)	(b)	(b)
30,587	33,578	36,424	44,770	51,920	60,585	67,279
(206)	(685)	(200)	(969)	(615)	4,425	3,861

FEDERAL OUTLAYS
DEFENSE, NASA AND AEROSPACE PRODUCTS AND SERVICES

Fiscal Years 1960-1983
(Millions of Dollars)

Year	TOTAL National Defense	TOTAL NASA	Federal Outlays for Aerospace Products & Services			Aerospace as Percent of Total National Defense and NASA
			TOTAL	DOD[a]	NASA	
1960	$ 45,691	$ 401	$12,849	$12,502	$ 347	27.9%
1961	47,494	744	13,606	12,960	646	28.2
1962	51,103	1,257	15,135	13,992	1,143	28.9
1963	52,755	2,552	16,186	13,857	2,327	29.3
1964	53,591	4,171	17,938	14,205	3,733	31.1
1965	49,578	5,093	15,697	11,135	4,561	28.7
1966	56,785	5,933	17,771	12,411	5,360	28.3
1967	70,081	5,426	20,011	14,874	5,137	26.5
1968	80,517	4,724	21,355	16,757	4,598	25.1
1969	81,232	4,251	20,472	16,286	4,185	23.9
1970	80,295	3,753	18,747	15,048	3,699	22.3
1971	77,661	3,382	17,335	13,997	3,338	21.4
1972	78,336	3,422	16,999	13,627	3,372	20.8
1973	74,571[r]	3,315	15,945	12,675	3,270	20.5
1974	77,781[r]	3,256	15,782	12,601	3,181	19.5
1975	85,552[r]	3,266	15,943	12,762	3,181	18.0
1976	89,430[r]	3,669	16,843	13,295	3,548	18.1
Tr. Qtr.	22,307[r]	952	3,944	3,018	926	17.0
1977	97,501	3,945	18,201	14,361	3,840	17.9
1978	105,186	3,983	12,624	8,765	3,859	11.6
1979	117,681	4,196	14,984	10,920	4,064	12.3
1980	135,856	4,852	18,297	13,585	4,712	13.0
1981	159,765	5,426	21,984	16,706	5,278	13.3
1982[E]	187,497	5,831	25,900	20,204	5,696	13.4
1983[E]	221,068	6,582	34,468	28,008	6,460	15.1

Source: "The Budget of the United States Government" (Annually).

NOTE: "National Defense" includes the military budget of the Department of Defense and other defense-related activities. "Total NASA" includes research and development activities, administrative operations and construction of facilities. NASA construction is not included in "Total Aerospace Products and Services."

[a] Prior to 1978, DOD outlays for aircraft and missile procurement and RDT&E. Effective 1978, includes only procurement; outlays for RDT&E by product group not available.

[r] Revised.

[E] Estimate.

FEDERAL OUTLAYS FOR AEROSPACE PRODUCTS AND SERVICES

Fiscal Years 1960-1983
(Millions of Dollars)

Year	TOTAL	Department of Defense[a]			NASA[b]
		TOTAL	Aircraft	Missiles	
1960	$12,849	$12,502	$ 7,416	$5,086	$ 347
1961	13,606	12,960	6,963	5,997	646
1962	15,135	13,992	7,773	6,219	1,143
1963	16,186	13,857	7,799	6,058	2,327
1964	17,938	14,205	8,276	5,929	3,733
1965	15,697	11,135	7,138	3,997	4,562
1966	17,771	12,411	8,541	3,870	5,360
1967	20,011	14,874	10,442	4,432	5,137
1968	21,355	16,757	12,016	4,741	4,598
1969	20,472	16,286	11,367	4,919	4,185
1970	18,747	15,048	9,940	5,108	3,699
1971	17,335	13,997	8,849	5,148	3,338
1972	16,999	13,627	8,461	5,166	3,372
1973	15,945	12,675	7,614	5,061	3,270
1974	15,782	12,601	7,460	5,141	3,181
1975	15,943	12,762	7,697	5,065	3,181
1976	16,843	13,295	8,704	4,591	3,548
Tr. Qtr.	3,944	3,018	2,096	922	926
1977	18,201	14,361	9,321	5,040	3,840
1978	12,624	8,765	6,971	1,794	3,859
1979	14,984	10,920	8,836	2,084	4,064
1980	18,297	13,585	11,124	2,461	4,712
1981	21,984	16,706	13,193	3,513	5,278
1982[E]	25,900	20,204	15,767	4,437	5,696
1983[E]	34,468	28,008	21,746	6,262	6,460

Source: Department of Defense Budget (Annually); NASA Budget (Annually).

[a] Prior to 1978, DOD outlays for aircraft and missile procurement and RDT&E. Effective 1978, includes only procurement; outlays for RDT&E by product group no longer available.

[b] Includes Research & Development, and Research & Program Management; excludes Construction of Facilities.

[E] Estimate.

DEPARTMENT OF DEFENSE AEROSPACE OUTLAYS

Fiscal Years 1960-1983
(Millions of Dollars)

Year	DOD Aerospace Outlays[a]		
	TOTAL	Procurement	Research, Development, Test and Evaluation
1960	$12,502	$ 9,299	$ 3,203
1961	12,960	8,870	4,090
1962	13,992	9,842	4,150
1963	13,857	10,126	3,731
1964	14,205	9,630	4,575
1965	11,135	7,296	3,839
1966	12,411	8,704	3,707
1967	14,875	10,341	4,534
1968	16,757	11,681	5,076
1969	16,286	11,686	4,600
1970	15,048	10,860	4,188
1971	13,997	9,771	4,226
1972	13,627	8,936	4,691
1973	12,675	8,089	4,586
1974	12,601	7,987	4,614
1975	12,762	8,373	4,389
1976	13,295	8,816	4,479
Tr. Qtr.	3,018	1,959	1,059
1977	14,361	9,389	4,972
1978	NA	8,765	NA
1979	NA	10,920	NA
1980	NA	13,585	NA
1981	NA	16,706	NA
1982[E]	NA	20,204	NA
1983[E]	NA	28,008	NA

Source: Department of Defense Budget (Annually).
[a] Excludes Military Assistance.
[E] Estimate.
NA Not Available.

Aircraft Production

Production of aircraft, as measured in dollar value of deliveries, climbed to a new record level in 1981. Sales of complete aircraft, engines and parts totaled $34.7 billion, which compares with $29.5 billion in the previous year. The increase amounted to slightly more than 17 percent.

The larger increase was in sales to U.S. government customers, predominantly the Department of Defense. This was a switch from the experience of recent years, in which non-government sales volume grew at a faster rate. In 1981, aircraft sales to government agencies totaled $12.2 billion, a gain of approximately 30 percent over 1980's $9.4 billion, reflecting the increasing momentum of the U.S. defense expansion program. Sales to other customers also increased, from $20.1 billion in 1980 to $22.5 billion in 1981, a gain of over 12 percent. As is traditional, aircraft sales accounted for more than half of the industry's aerospace sales.

The industry's backlog of orders for aircraft, engines and parts experienced a significant change: it increased in terms of current dollars but actually declined—for the first time since 1975—in inflation-adjusted constant dollars. Total backlog at the end of 1981, in current dollars, was $62.1 billion. At $41.1 billion, orders from non-government customers accounted for two-thirds of the backlog. The greater backlog growth, however, was in orders from the U.S. government, which amounted to $21 billion, up from $17.5 billion at the end of the previous year.

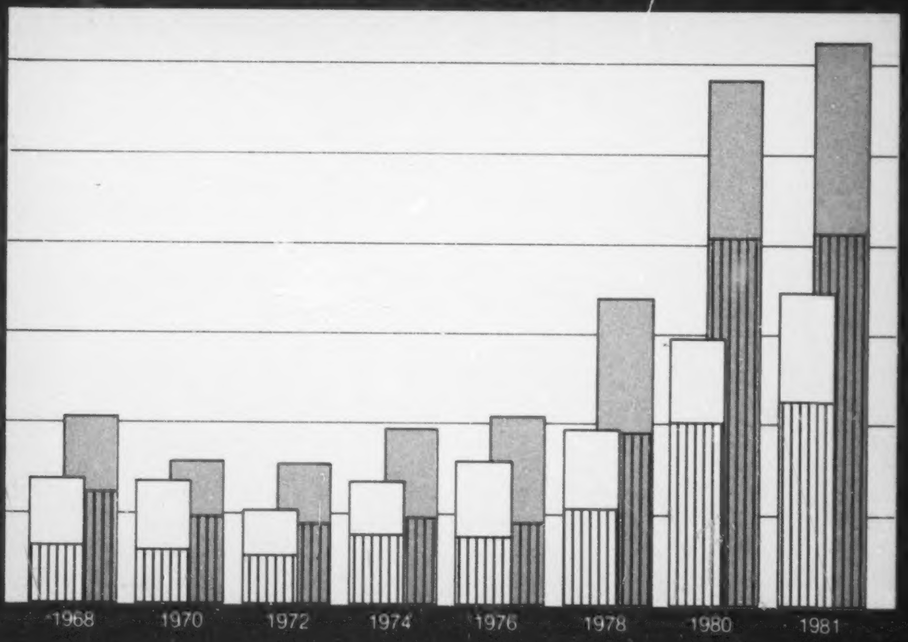
Among other aircraft production highlights:

- Shipments of general aviation aircraft dropped to 9,457 units, down from 11,881 in 1980 and the lowest level in a decade. However, the dollar value of sales increased some $400 million to $2.9 billion. The higher value of fewer shipments is due to continuing strong production of high-value jet and turboprop business aircraft and a recession-induced reduction in sales of lower-value piston-powered planes.
- Civil helicopter production, which had grown dramatically over the prior decade, declined in 1981. The rotary wing segment of the industry produced 1,072 helicopters, 294 fewer than in the previous year; dollar value dropped from $656 million in 1980 to $597 million in 1981. Military acceptances of helicopters (for both U.S. and foreign use) totaled 158 (down 31) with a total dollar value of $825 million (up more than $300 million).
- The industry delivered 387 civil transport aircraft, the same number as in 1980, but dollar value—$9.7 billion in 1981—declined some $200 million. The transport backlog dropped sharply; at year-end 1981 it was $17.2 billion, down from $20.8 billion a year earlier. The drop was due for the most part to the financial difficulties of the world's airlines, which caused deferment, and in some cases cancellations, of orders for new equipment. Of particular note was the reduction in orders from foreign carriers, which for several years had constituted more than half of the U.S. aircraft industry's backlog; such orders amounted to 45 percent of the total backlog at year-end 1981.

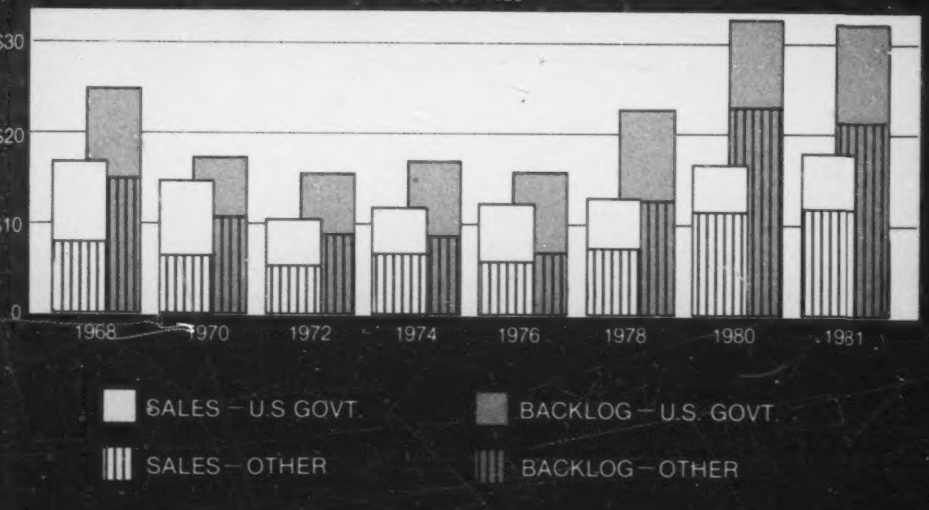
Military aircraft production remained at approximately the previous year's level in terms of numbers. Overall production amounted to 1,048 aircraft, five fewer than in 1980; this included 689 planes for use by U.S. military agencies (up 58); 215 accepted by the Department of Defense for delivery to foreign governments under Foreign Military Sales or Military Assistance Programs (up 21); and 144 military aircraft sold to foreign customers on a commercial basis (down 84). The value of DOD acceptances—904 aircraft compared with 825 in 1980—was $8.6 billion, up $2.1 billion over the previous year. The grand total of all military aircraft work performed by the industry, including deliveries to DOD, commercial shipments, aircraft and engine spare parts, and aircraft-related R&D was $19.2 billion, which compares with $13.9 billion in 1980.

SALES AND BACKLOG OF AIRCRAFT, ENGINES, AND PARTS

(Billions of Current Dollars)



(Billions of Constant Dollars)
1972 = 100



Source: Bureau of the Census, U.S. Dept. of Commerce

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SALES OF COMPLETE AIRCRAFT, AIRCRAFT ENGINES, AND PARTS

Calendar Years 1968-1981
(Millions of Dollars)

Year	TOTAL			Aircraft & Parts		Aircraft Engines & Parts	
	TOTAL	U.S. Gov't.	Other	U.S. Gov't.	Other	U.S. Gov't.	Other
CURRENT DOLLARS							
1968	$13,850	$ 7,411	$ 6,439	$ 5,697	$ 5,188	$1,714	$1,251
1969	12,764	7,161	5,603	5,382	4,517	1,779	1,086
1970	13,466	7,586	5,880	5,674	4,683	1,912	1,197
1971	11,392	6,313	5,079	4,953	4,093	1,360	986
1972	10,153	4,954	5,199	3,666	4,085	1,288	1,114
1973	12,278	5,539	6,739	4,231	5,322	1,308	1,417
1974	13,542	5,982	7,560	4,562	5,846	1,420	1,714
1975	14,656	6,859	7,797	5,269	6,001	1,590	1,796
1976	15,936	8,314	7,622	6,336	5,900	1,978	1,722
1977	16,378	8,848	7,530	6,855	5,670	1,993	1,860
1978	19,305	8,724	10,581	6,853	7,873	1,871	2,708
1979	24,672	8,649	16,023	6,378	12,701	2,271	3,322
1980[r]	29,524	9,427	20,097	6,724	15,901	2,703	4,196
1981	34,695	12,168	22,527	8,598	17,996	3,570	4,531
CONSTANT DOLLARS (1972 = 100)[a]							
1968	$16,780	$8,979	$7,801	$6,902	$6,285	$2,077	$1,516
1969	14,707	8,251	6,456	6,201	5,205	2,050	1,251
1970	14,725	8,295	6,430	6,204	5,121	2,091	1,309
1971	11,865	6,575	5,290	5,159	4,263	1,417	1,027
1972	10,153	4,954	5,199	3,666	4,085	1,288	1,114
1973	11,617	5,241	6,376	4,003	5,035	1,238	1,341
1974	11,784	5,205	6,578	3,970	5,087	1,236	1,491
1975	11,673	5,463	6,210	4,197	4,779	1,266	1,430
1976	12,063	6,293	5,769	4,796	4,466	1,497	1,303
1977	11,713	6,328	5,385	4,902	4,055	1,425	1,330
1978	12,866	5,814	7,052	4,567	5,247	1,247	1,805
1979	15,158	5,314	9,844	3,918	7,803	1,395	2,041
1980	16,646	5,315	11,331	3,791	8,965	1,524	2,366
1981	17,911	6,282	11,629	4,439	9,290	1,843	2,339

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] Based on GNP implicit price deflator.

[r] Revised.

BACKLOG OF COMPLETE AIRCRAFT, AIRCRAFT ENGINES, AND PARTS

As of December 31, 1968-1981
(Millions of Dollars)

Year	TOTAL			Aircraft & Parts		Aircraft Engines & Parts	
	TOTAL	U.S. Gov't.	Other	U.S. Gov't.	Other	U.S. Gov't.	Other
CURRENT DOLLARS							
1968	$20,559	$ 8,150	$12,409	$ 5,999	$10,609	$2,151	$1,800
1969	19,188	7,089	12,099	5,270	10,340	1,819	1,759
1970	15,713	5,913	9,800	4,663	8,601	1,250	1,199
1971	14,280	6,221	8,059	4,876	7,123	1,345	936
1972	15,632	7,027	8,605	5,705	7,355	1,322	1,250
1973	16,365	7,815	8,550	6,312	7,232	1,503	1,318
1974	19,391	9,789	9,602	7,698	7,791	2,091	1,811
1975	18,892	10,751	8,141	8,743	6,646	2,008	1,495
1976	20,879	11,950	8,929	9,905	7,416	2,045	1,513
1977	25,063	12,471	12,592	9,557	10,152	2,914	2,440
1978	33,869	14,897	18,972	11,759	16,508	3,138	2,464
1979	50,484	17,316	33,168	13,331	27,955	3,985	5,213
1980[r]	58,183	17,514	40,669	13,062	33,526	4,452	7,143
1981	62,136	21,017	41,119	15,682	32,564	5,335	8,555
CONSTANT DOLLARS (1972 = 100)[a]							
1968	$24,908	$9,874	$15,034	$7,268	$12,853	$2,606	$2,181
1969	22,109	8,168	13,941	6,072	11,914	2,096	2,027
1970	17,182	6,466	10,716	5,099	9,405	1,367	1,311
1971	14,873	6,480	8,394	5,079	7,419	1,401	975
1972	15,632	7,027	8,605	5,705	7,355	1,322	1,250
1973	15,484	7,394	8,090	5,972	6,843	1,422	1,247
1974	16,873	8,518	8,355	6,699	6,779	1,820	1,576
1975	15,046	8,562	6,484	6,963	5,293	1,599	1,191
1976	15,804	9,045	6,759	7,498	5,614	1,548	1,145
1977	17,924	8,919	9,005	6,835	7,260	2,083	1,745
1978	22,572	9,928	12,644	7,837	11,002	2,091	1,642
1979	31,016	10,638	20,377	8,190	17,175	2,448	3,203
1980	32,805	9,875	22,930	7,365	18,903	2,510	4,027
1981	32,077	10,850	21,227	8,096	16,811	2,754	4,416

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] Based on GNP implicit price deflator.

[r] Revised.

U.S. AIRCRAFT PRODUCTION

Calendar Years 1968-1981

CIVIL AIRCRAFT

Year	TOTAL	Domestic Shipments[a]			Export Shipments		
		Transports[a]	Helicopters	General Aviation	Transports	Helicopters	General Aviation
1968	14,922	462	279	10,819	240	243	2,879
1969	13,505	332	282	9,996	182	252	2,461
1970	8,076	127	150	5,246	184	332	2,037
1971	8,158	50	171	5,900	173	298	1,566
1972	10,576	79	319	7,702	148	256	2,072
1973	14,709	143	342	10,482	151	428	3,163
1974	15,326	91	433	9,903	241	395	4,263
1975	15,251	127	528	10,804	188	336	3,268
1976	16,429	64	442	12,232	158	315	3,218
1977	17,913	54	527	13,441	101	321	3,469
1978	18,962	130	536	14,346	111	368	3,471
1979	18,450	176	560	13,177	200	459	3,878
1980	13,634	150	841	8,703	237	525	3,178
1981	10,916	132	619	6,840	255	453	2,617

MILITARY AIRCRAFT[r]

Year	TOTAL	U.S. Military Agencies	Exports		
			Total	FMS/MAP	Commercial
1968	4,894	4,440	454	NA	NA
1969	4,290	3,644	646	NA	NA
1970	3,720	3,085	635	NA	NA
1971	2,914	2,232	682	NA	NA
1972	2,530	1,993	537	124	413
1973	1,821	1,243	578	129	449
1974	1,513	799	714	365	349
1975	1,779	844	935	525	410
1976	1,318	625	693	518	175
1977	1,134	454	680	408	272
1978	996	467	529	256	273
1979	837	531	306	203	103
1980	1,053	631	422	194	228
1981	1,048	689	359	215	144

Source: Civil shipments data from company reports to AIA and General Aviation Manufacturers Association. Military acceptances for use of U.S. military agencies and for Foreign Military Sales and Military Assistance Programs reported by USAF, USN and Army. Export data from Dept. of Commerce (Bureau of the Census) Report FT410.

[a] Prior to 1976, includes the C-130 military transport.

NA Not available.

[r] Revised from previously published data for 1968-1975 to include military aircraft exported commercially (manufacturer-to-government).

CIVIL AIRCRAFT SHIPMENTS

Calendar Years 1967-1981

Year	TOTAL	Transport Aircraft	Helicopters	General Aviation
NUMBER OF AIRCRAFT SHIPPED				
1967	14,512	480	455	13,577
1968	14,922	702	522	13,698
1969	13,505	514	534	12,457
1970	8,076	311	482	7,283
1971	8,158	223	469	7,466
1972	10,576	227	575	9,774
1973	14,709	294	770	13,645
1974	15,326	332	828	14,166
1975	15,251	315	864	14,072
1976[a]	16,429	222	757	15,450
1977[a]	17,913	155	848	16,910
1978[a]	18,962	241	904	17,817
1979[a]	18,450	376	1,019	17,055
1980	13,634	387	1,366	11,881
1981	10,916	387	1,072	9,457
VALUE—Millions of Dollars				
1967	$2,861	$2,458	$43	$ 360
1968	4,267	3,789	57	421
1969	3,598	2,939	75	584
1970	3,546	3,158	49	339
1971	2,984	2,594	69	321
1972	3,308	2,660	90	558
1973	4,665	3,718	121	826
1974	5,091	3,993	189	909
1975	5,086	3,779	274	1,033
1976[a]	4,592	3,078	285	1,229
1977[a]	4,451	2,649	251	1,551
1978[a]	6,458	4,308	328	1,822
1979[a]	10,644	8,030	403	2,211
1980	13,058	9,895	656	2,507
1981	13,223	9,706	597	2,920

Source: Transport Aircraft and Helicopters: Aerospace Industries Association, company reports. General Aviation: General Aviations Manufacturers' Association and Aerospace Industries Association, company reports.

[a] Transport aircraft shipments data have been revised for 1976-1979 to exclude the Lockheed C-130, such that data for previous years are not strictly comparable.

CIVIL TRANSPORT AIRCRAFT BACKLOG

As of December 31, 1977-1981

Company and Model	1977	1978	1979	1980	1981
TOTAL AIRCRAFT ON ORDER					
(Domestic and Foreign Orders)	345	622	828	715	526
Value (Millions of Dollars)	$ 6,182	$13,098	$21,322	$20,799	$17,198
Boeing—TOTAL	242	426	611	535	447
B-707	4	1	—	—	—
B-727	157	195	212	104	35
B-737	36	111	159	175	146
B-747	45	89	106	71	37
B-757	—	—	40	49	82
B-767	—	30	94	136	147
Lockheed—TOTAL	18	40	56	50	27
L-1011	18	40	56	47	21
L-100	—	—	—	3	6
McDonnell Douglas—TOTAL	85	156	161	130	52
DC-9	55	101	108	105	43
DC-10	30	55	53	25	9
TOTAL FOREIGN ORDERS	165	304	436	401	213
Value (Millions of Dollars)	$ 3,785	$ 7,100	$11,848	$12,166	$ 7,702
Boeing—TOTAL	95	194	312	303	180
B-707	4	1	—	—	—
B-727	35	51	74	48	10
B-737	16	77	127	134	71
B-747	40	65	88	70	37
B-757	—	—	19	22	22
B-767	—	—	4	29	40
Lockheed—TOTAL	11	17	33	32	17
L-1011	11	17	33	29	11
L-100	—	—	—	3	6
McDonnell Douglas—TOTAL	59	93	91	66	16
DC-9	41	58	58	46	8
DC-10	18	35	33	20	8

Source: Aerospace Industries Association, company reports.

[a] Firm unfilled orders, excluding options, for U.S. manufactured transport aircraft over 33,000 pounds, including all jet transports plus the turboprop-powered Lockheed L-100.

SPECIFICATIONS OF U.S. CIVIL JET TRANSPORT AIRCRAFT[a]

In Production as of 1982

Manufacturer & Model by Number of Engines	Crew Complement	No. of Aisles	No. of Passengers	Operating Empty Wt. (000's lbs.)	Most Efficient Cruise Speed (Mach)
Four Engines					
Boeing 707	3	1	147	146	M.8-.83
Boeing 747 Series	3	2	331-550	324-397	M.8-.84
Three Engines					
Boeing 727 series	3	1	145-189	98-102	M.8-.84
Lockheed L-1011 series	3	2	242-304	242-249	M.83
McDonnell-Douglas DC-10 series	3	2	250-380	245-272	M.82
Two Engines					
Boeing 737 series	2	1	115-132	61-72	M.73-.78
Boeing 757 series	2	1	178-186	128-130	M.8
Boeing 767 series	2	2	211	178-179	M.8
McDonnell-Douglas DC-9 series	2	1	107-172	60-81	M.76-.78

Source: AIA, company reports.

[a] All jet-powered passenger transport aircraft having empty weight of 33,000 pounds or more.

CIVIL TRANSPORT AIRCRAFT SHIPMENTS

Calendar Years 1977-1981

Company and Model	1977	1978	1979	1980	1981
TOTAL					
Number of Aircraft Shipped ..	155	241	376	387	387
Value (Millions of Dollars)....	$ 2,649	$4,308	$ 8,030	$ 9,895	$ 9,706
Boeing—TOTAL	115	193	281	296	255
B-707	3	3	1	—	—
B-727	67	118	136	131	94
B-737	25	40	77	92	108
B-747	20	32	67	73	53
Lockheed—TOTAL	12	10	21	26	36
L-1011	11	8	14	24	28
L-100	1	2	7	2	8
McDonnell Douglas—TOTAL...	28	38	74	65	96
DC-9	16	20	39	25	77
DC-10	12	18	35	40	19

Source: Aerospace Industries Association, company reports.

COMMERCIAL HELICOPTER SHIPMENTS[a]

Calendar Years 1977-1981

Company and Model	1977	1978	1979	1980	1981
COMMERCIAL SHIPMENTS	884	935	1,054	1,452	1,105
Value (Millions of Dollars)	$316	$367	$457	$754	$783
CIVIL SHIPMENTS	848	904	1,019	1,366	1,072
Value (Millions of Dollars)	$251	$328	$403	$656	$597
Bell—TOTAL	374	438	612	780	609
205	11	23	18	30[c]	—
206 series	283	322	469	550	476
212	47	50	86	116	49
214 series	9	16	8	7	12
222	—	—	—	41	21
412	—	—	—	—	51
AH-1J[b]	7	—	—	—	—
AH-1S[b]	—	—	1	1	—
UH-1H[b]	17	27	30	35	—
Boeing Vertol—TOTAL	12	4	4	6	28
CH-47[b]	12	4	4	6	23
234	—	—	—	—	5
Brantley-Hynes—TOTAL	1	11	2	—	—
B-2B	1	11	2	—	—
Enstrom—TOTAL	96	91	46	48	46
F-28 series	44	44	27	18	29
280C	52	47	19	30	10
280F	—	—	—	—	7
Hiller—TOTAL	40	52	43	49	30
12-E series	35	52	43	41	23
12-ET series	5	—	—	8[c]	6
FH-1100	—	—	—	—	1
Hughes—TOTAL	336	312	306	401	186
300 series	125	116	110	136	50
500 series	211	196	196	265[c]	136[c]
Robinson—TOTAL	—	—	—	78	156
R22	—	—	—	78	156
Sikorsky (UTC)—TOTAL	25	27	41	90	50
S-61	25	27	5	5	—
S-76	—	—	36	85	50[c]

Source: Aerospace Industries Association, company reports.

NOTE: All data exclude production by foreign licensees.

[a] Shipments to customers other than the U.S. Government, including all civil shipments plus commercial (manufacturer-to-customer) military exports, and excluding deliveries to U.S. military agencies for shipment to foreign governments under Military Assistance Programs and Foreign Military Sales.

[b] Military configuration for commercial export sale.

[c] Includes the following helicopters commercially exported in military configuration: 4 Bell 205's, 4 Hiller 12-ET's, and 36 Hughes 500's in 1980; 2 Hughes 500's and 8 Sikorsky S-76's in 1981.

GENERAL AVIATION AIRCRAFT SHIPMENTS

By Selected Manufacturers

Calendar Years 1977-1981

	1977	1978	1979	1980	1981
NUMBER OF AIRCRAFT SHIPPED	16,910	17,817	17,055	11,881	9,457
Single-Engine, Piston	13,167	13,651	12,693	8,283	6,268
Multi-Engine, Piston	2,195	2,630	2,843	2,116	1,542
Agricultural	890	748	593	357	340
Turboprop	428	548	637	795	918
Turbojet	230	240	289	330	389
VALUE OF SHIPMENTS[a] (Millions of Dollars)	$ 1,551	$ 1,822	$ 2,211	$ 2,507	$ 2,920
Single-Engine, Piston	435	486	490	365	315
Multi-Engine, Piston	389	492	557	402	389
Agricultural	39	33	35	25	24
Turboprop	295	393	550	874	1,017
Turbo-jet	393	418	579	841	1,175
Number of Aircraft By Selected Manufacturer					
Ayres	—	134	99	44	59
Beech	1,203	1,367	1,508	1,394	1,242
Bellanca	252	370	443	103	—
Cessna	8,839	8,770	8,400	6,393	4,680
Fairchild/Swearingen	28	51	70	86	85
Gates Learjet	105	102	107	120	138
Gulfstream American	866	933	400	167	284
Lake	99	98	96	79	52
Lockheed Jetstar	16	9	7	4	—
Maule	108	88	67	59	44
Mooney	362	379	439	332	330
Piper	4,499	5,272	5,255	2,954	2,495
Rockwell International	432	244	164	146	40
Schweizer Aircraft	—	—	—	—	8
Ted Smith Aerostar	101	—	—	—	—

Source: General Aviation Manufacturers' Association and Aerospace Industries Association.

[a] Manufacturers' net billing price.

MILITARY AIRCRAFT ACCEPTED BY U.S. MILITARY AGENCIES

Number and Flyaway Value
Calendar Years 1967-1981

Year	TOTAL	Bomber/ Patrol	Fighter/ Attack	Trans-port/ Tanker	Trainer	Heli-copter	Other
NUMBER							
1967	4,481	404	811	135	331	2,448	352
1968	4,440	34	1,007	18	292	2,800	289
1969	3,644	31	792	44	295	2,165	317
1970	3,085	66	734	37	173	1,944	131
1971	2,232	48	386	42	135	1,587	34
1972	2,117	13	563	29	148	1,312	52
1973	1,372	30	422	22	90	808	—
1974	1,110	50	478	27	49	506	—
1975	1,369	62	624	34	40	601	8
1976	1,143	55	646	67	11	348	16
1977	862	44	488	25	12	273	20
1978	723	22	478	36	—	166	21
1979	734	12	529	21	—	158	14
1980r	825	16	557	37	18	189	8
1981	904	19	650	17	45	158	15
FLYAWAY VALUE—Millions of Dollars							
1967	$4,476	$ 822	$1,721	$ 759	$ 144	$ 962	$ 68
1968	3,871	117	2,451	81	167	905	150
1969	3,693	248	2,204	101	164	845	131
1970	3,920	545	1,940	555	111	694	75
1971	2,996	397	1,322	688	112	469	8
1972	3,247	129	2,068	536	100	396	18
1973	2,571	325	1,490	348	140	268	—
1974	2,224	584	1,222	101	111	206	—
1975	3,172	599	2,054	128	27	359	5
1976	4,729	547	3,421	340	27	384	10
1977	4,364	499	3,190	331	14	316	14
1978	4,664	313	3,496	613	—	225	17
1979	5,470	199	4,660	379	—	219	13
1980r	6,521	475	5,289	202	32	516	7
1981	8,630	526	6,719	509	32	825	19

Source: Department of Defense.

NOTE: Data exclude gliders and targets, and include spares, spare parts, and support equipment that are procured with the aircraft. 1966-1967, Navy attack planes included with bombers; 1968-1978, Navy attack planes included under fighter/attack. Effective 1972, includes aircraft accepted for shipment to foreign governments for military assistance programs and foreign military sales. 1972-1975, Flyaway value does not include the value of planes produced for the security assistance programs and accepted by the USAF.

r Revised.

MILITARY AIRCRAFT PRODUCTION FOR UNITED STATES AIR FORCE[a] BY TYPE AND MODEL

Calendar Years 1980 and 1981
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1980[r]	1981	1980[r]	1981	1980[r]	1981
AIR FORCE—TOTAL	365	398	$3,123	$3,687	$3,787	$4,081
Fighter/Attack—TOTAL	353	385	2,798	3,109	3,434	3,458
A-7K	—	16	—	141	—	155
A-10A	144	141	701	740	782	812
F-15A/B/C/D	84	67	1,182	1,018	1,373	1,101
F-16A/B	125	161	915	1,210	1,279	1,390
Transports/Tankers—TOTAL	8	10	56	391	63	403
C-130H	8	4	56	41	63	42
KC-10A	—	6	—	350	—	361
Command/Control—TOTAL	4	3	269	187	290	220
E-3A	4	2	269	162	290	194
TR-1A	—	1	—	25	—	26

Source: Department of the Air Force.

NOTE: Costs shown are approximate. Calendar year acceptances may derive from procurement quantities funded in more than one fiscal year.

[a] Air Force acceptances for own use; exclude FMS/MAP shipments.

[b] Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment and non-recurring costs associated with the manufacture of the aircraft.

[c] Weapon System Cost includes flyaway costs, peculiar ground equipment, training equipment and technical data.

[r] Revised.

MILITARY AIRCRAFT PRODUCTION FOR UNITED STATES NAVY[a] BY TYPE AND MODEL

Calendar Years 1980 and 1981
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1980[r]	1981	1980[r]	1981	1980[r]	1981
NAVY—TOTAL	106	140	$1,581	$2,158	$1,989	$2,636
Patrol—TOTAL	12	12	206	260	347	307
P-3C	12	12	206	260	347	307
Attack—TOTAL	33	24	332	406	451	514
A-6E	12	12	102	207	146	256
EA-6B	6	6	127	157	170	204
A-7E	15	6	103	42	135	54
Fighters—TOTAL	34	41	899	1,210	1,031	1,474
F-14A	30	30	717	804	782	909
F/A-18[d]	4	11	182	406	249	565
Helicopters—TOTAL	2	15	38	178	40	221
CH-53E	2	15	38	178	40	221
Support—TOTAL	25	48	106	104	120	120
C-9B	—	2	—	36	—	41
UC-12B	22	—	24	—	26	—
T-34	—	45	—	32	1	32
EC-130Q	3	1	82	36	93	47

Source: Department of the Navy.

[a] Navy acceptances for own use; exclude FMS/MAP shipments.

[b] Flyaway Cost includes airframe, engines, electronics, communications, armament and other installed equipment.

[c] Weapon System Cost includes flyaway items, initial spares, ground equipment, training equipment and other support items.

[d] Four aircraft in 1980 and five aircraft in 1981 were pilot production aircraft, and other six 1981 acceptances were limited production aircraft; thus cost figures are not representative of full-rate production costs.

[r] Revised.

MILITARY AIRCRAFT PRODUCTION FOR UNITED STATES ARMY[a] BY TYPE AND MODEL

Calendar Years 1980 and 1981
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]	
	1980	1981	1980	1981
ARMY—TOTAL	160	151	$463	$657
Helicopters—TOTAL	152	141	456	645
AH-1S	78	21	137	77
CH-47C	7	—	74	—
UH-60A	67	120	245	568
Other—TOTAL	8	10	7	12
C-12D	6	10	5	12
UV-18	2	—	2	—

Source: Department of the Army.

[a] Army acceptances for own use; exclude FMS/MAP shipments.

[b] Flyaway cost includes airframes, engines, electronics, communications, armament and other installed equipment.

[r] Revised.

MILITARY AIRCRAFT PRODUCTION FOR MILITARY ASSISTANCE PROGRAMS AND FOREIGN MILITARY SALES, BY ACCEPTING AGENCY, TYPE AND MODEL

Calendar Years 1980 and 1981
(Millions of Dollars)

Accepting Agency, Type and Model	Number of Aircraft Accepted		Flyaway Cost[a]	
	1980	1981	1980	1981
TOTAL ACCEPTANCES FOR REIMBURSABLE PROGRAMS	194	215	$1,354	$2,128
AIR FORCE—TOTAL	154	204	1,301	2,040
Fighter/Attack—TOTAL	137	200	1,260	1,994
A-37	10	—	1	—
F-5E	47	44	202	242
F-5F	17	17	90	102
F-15C/D	2	10	34	290
F-16A/B	61	129	933	1,360
Transport/Tankers—TOTAL	4	4	40	46
C-130	4	4	40	46
Trainers—TOTAL	13	—	0.6	—
T-33	4	—	0.2	—
T-37	9	—	0.4	—
NAVY—TOTAL	5	4	31	79
Trainers—TOTAL	5	—	31	—
TA-7H	5	—	31[b]	—
Patrol—TOTAL	—	4	—	79
P-3C	—	4	—	79
ARMY—TOTAL	35	7	22	9
Helicopters—TOTAL	35	2	22	2
UH-1H	35	—	22	—
205-A	—	2	—	2
Other—TOTAL	—	5	—	7
C-12D	—	5	—	7

Source: Departments of the Air Force, Navy and Army.

[a] Flyaway cost includes airframe, engines, electronics, communications, armament, other installed equipment and nonrecurring costs associated with the manufacture of the aircraft.

[b] Engines excluded.

DEPARTMENT OF DEFENSE OUTLAYS FOR AIRCRAFT PROCUREMENT

By Agency
Fiscal Years 1960-1983
(Millions of Dollars)

Year	TOTAL AIRCRAFT PROCUREMENT	Air Force	Navy	Army
1960	$ 6,272	$ 4,414	$ 1,765	$ 93
1961	5,898	3,926	1,832	140
1962	6,659	4,387	2,102	170
1963	6,309	3,747	2,328	234
1964	6,053	3,894	1,859	300
1965	5,200	3,115	1,739	346
1966	6,635	4,074	2,021	540
1967	8,411	4,842	2,607	962
1968	9,462	5,079	3,244	1,139
1969	9,177	5,230	2,821	1,126
1970	7,948	4,623	2,488	837
1971	6,631	3,960	2,125	546
1972	5,927	3,191	2,347	389
1973	5,066	2,396	2,557	113
1974	5,006	2,078	2,806	122
1975	5,484	2,211	3,137	136
1976	6,520	3,323	3,061	136
Tr. Qtr.	1,557	859	672	26
1977	6,608	3,586	2,721	301
1978	6,971	3,989	2,602	380
1979	8,836	5,138	3,140	558
1980	11,124	6,647	3,689	788
1981	13,193	7,941	4,397	855
1982^{E}	15,767	9,165	5,658	944
1983^{E}	21,746	12,458	7,820	1,468

Source: Department of Defense Budget (Annually).
E Estimate.

MILITARY AIRCRAFT PROGRAM PROCUREMENT INCLUDING INITIAL SPARES[a]

Fiscal Years 1981, 1982 and 1983
(Millions of Dollars)

Agency, Type and Model	1981		1982[E]		1983[E]	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
A-7K	6	$ 107.9	-	$ -	-	$ -
A-10 A/E Thunderbolt II	60	613.5	20	235.9	20	360.7
B-1B	-	-	1	1,621.9	7	4,033.5
B-52G Cruise Missile Carrier Aircraft Modification	40	85.8	40	95.6	22	155.6
B-52G/H Avionics Modernization	64	284.0	61	256.1	64	312.2
C-5 Wing Modification	12	165.3	18	186.5	18	190.2
C-5	-	-	-	270.0	2	860.0
C-130 Hercules	6	72.0	8	113.6	-	-
C-141 Modification	33	25.6	-	-	-	-
E-3A (AWACS)	2	270.0	2	257.9	2	176.7
European Distribution System Aircraft (EDSA)	-	-	-	-	2	6.5
EF-111A Modification	12	262.8	12	270.6	9	206.4
F-5F	-	7.0	3	25.0	3	29.3
F-15 Eagle	42	1,103.3	36	1,175.0	42	1,682.3
F-16 Multimission Fighter	180	1,941.9	120	2,273.0	120	2,225.9
KC-10A (ATCA)	6	327.0	6	357.4	8	829.1
KC-135 Re-engining/ Modernization	9	102.5	9	246.7	25	584.0
TR-1	4	122.9	5	138.6	4	177.6
UH-60A Blackhawk	5	31.0	6	37.8	-	-
NATO AWACS (U.S. Share)	-	382.0	-	344.3	-	186.1
LANTIRN (Night Precision Attack)	-	1.0	-	5.0	-	15.7
PLSS (Precision Location)	-	-	-	1.7	-	1.8
ARMY						
AH-1S Cobra/Tow	15	$ 46.1	12	$ 55.7	-	$ -
AH-64 Attack Helicopter	-	58.8	-	544.0	48	965.0
C-12	6	8.8	6	10.6	6	11.0
RC-12D	-	-	-	-	6	42.4
UH-60 Blackhawk	80	486.5	96	613.0	96	733.0
CH-47 Modernization	9	212.6	19	310.2	24	288.4
UV-18A	-	-	2	3.6	-	-

(Continued on next page)

MILITARY AIRCRAFT PROGRAM PROCUREMENT INCLUDING INITIAL SPARES[a] (Continued)

Fiscal Years 1981, 1982 and 1983
(Millions of Dollars)

Agency, Type and Model	1981		1982[E]		1983[E]	
	No.	Cost	No.	Cost	No.	Cost
NAVY						
A-6E Intruder	12	$ 270.7	12	$ 295.0	8	$ 276.6
AH-1T Improved Sea Cobra	–	–	–	–	–	17.2
AV-8B	–	88.7	12	669.6	18	942.9
C-2 Greyhound	–	–	–	37.0	8	284.9
C-9B Skytrain II	2	36.5	–	–	–	16.2
CH-53E Super Stallion	14	235.3	14	260.8	11	311.0
E-2C Hawkeye	6	240.8	6	266.2	6	352.7
EA-6B Prowler	6	223.6	6	277.1	6	347.1
EC-130Q Hercules	1	45.5	2	76.6	–	36.8
F-14A Tomcat	30	927.4	30	1,184.9	24	1,178.6
F/A-18 Hornet	60	2,012.3	63	2,420.8	84	2,847.4
KC-130R Hercules	–	–	4	64.0	–	–
P-3C Orion	12	308.5	12	441.0	6	341.8
SH-60B Seahawk LAMPS	–	105.0	18	727.3	48	1,231.6
SH-2F Seasprite (LAMPS MK-I)	–	19.7	18	189.7	18	205.1
T-34C Mentor	60	41.6	60	53.1	30	34.4
TH-57A Sea Ranger	32	14.7	30	20.6	21	23.2

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget, (Annually).

[a] Total Obligational Authority.

[E] Estimate.

ACTIVE U.S. MILITARY AIRCRAFT IN CONTINENTAL U.S.[a]

Fiscal Years 1975-1983

Fiscal Year	Total	Fixed Wing Aircraft				Helicopter
		Total	Jet	Turboprop	Piston	
1975	19,889	12,751	9,526	1,298	1,927	7,138
1976	19,775	12,126	9,255	1,511	1,360	7,649
1977	18,670	11,625	9,168	1,382	1,075	7,045
1978	18,931	11,748	8,898	1,794	1,056	7,183
1979	18,526	11,365	8,656	1,859	850	7,161
1980	18,969	11,362	8,794	1,869	699	7,607
1981[p]	19,538	11,823	9,212	1,987	624	7,715
1982[E]	19,828	11,934	9,393	2,020	521	7,894
1983[E]	20,012	12,007	9,480	2,090	437	8,005

Source: Department of Defense, Office of Secretary of Defense, reported in "FAA Aviation Forecasts" (Annually).

[a] Includes Army, Air Force, Navy, and Marine regular service aircraft, as well as Reserve and National Guard aircraft.

[p] Preliminary.

[E] Estimate.

Industry sales of missile systems increased sharply in 1981, continuing an upward trend initiated in 1978. For 1981, net sales were $4.7 billion, some 17 percent above the previous year's $4 billion. The figures are indicators of broader industry missile activity; they include sales of missiles and parts but do not include propulsion systems or funding for research, development, test and evaluation. The backlog of orders at the end of 1981 was $5.5 billion (again excluding propulsion/RDT&E), the same as at year-end 1980.

The upward trend in missile acquisition is confirmed by Department of Defense data on outlays for Air Force/Army procurement (Navy figures are not available.) USAF/Army procurement in Fiscal Year 1981 totaled $3.5 billion, up 40 percent from 1980's $2.5 billion. The estimate for FY 1982 is $4.4 billion and for FY 1983 $6.3 billion.

On the basis of procurement funding for FY 1982, cruise missiles constitute the largest production program; combined funding of $1.2 billion is provided for three types:

the USAF Air Launched Cruise Missile, the Navy's sea-launched Tomahawk and the USAF's Ground Launched Cruise Missile. Production of the Navy's Trident 1 fleet ballistic missile, operational since 1979, ranks as the second largest program ($900 million).

The Army's principal missiles in production at year-end were the Patriot air defense system and the Pershing II field ballistic missile; the latter progressed to production status in 1981. Also in production and in flight test during 1981 was the Multiple Launch Rocket System (MLRS), an Army system for neutralizing enemy artillery and air defense weapons by rocket firepower from self-propelled loader/launchers.

Among other missile systems in production during 1981/82 are the Navy's air-launched/sea-launched Harpoon, an antishipping missile; four versions of the Navy air defense weapon Standard; the Army's man-portable, shoulder-fired Stinger, a short range antiaircraft missile; the TOW antitank missile, being produced for the Army and Marine Corps; the improved Hawk mobile air defense system, operational with Army, Marine Corps and NATO units; the Army's Laser Hellfire, a long-range helicopter-launched antiarmor weapon; the Army's Copperhead laser-guided artillery projectile; the Navy's long-range air-to-air missile Phoenix; and several versions of the infrared-guided Sidewinder and the radar-guided Sparrow, air-to-air missiles carried aboard Air Force and Navy aircraft.

Heading the list of missile development programs which have not yet reached production status is the Air Force MX intercontinental missile. In 1981, the Administration announced plans to deploy 100 MXs, but the manner in which they will be based was not decided. The Administration's strategic weapons program also icludes development of the Navy Trident 2 submarine-launched ballistic missile for deployment in the late 1980s.

Other missile developments under way in 1981/82 include the USAF's Imaging Infrared Maverick air-to-surface missile; the Air Force/Navy Advanced Medium Range Air-to-Air Missile (AMRAAM), which progressed to flight test status in 1981; the Navy/USAF High-speed Anti-Radiation Missile (HARM), an air-to-surface weapon scheduled for production under FY 1983 funding; the Air Force/Navy Laser Maverick, another air-to-surface weapon scheduled for 1983 production; the Tomahawk 2 standoff air-to-surface cruise missile, for use aboard USAF and Navy aircraft; and the Army's Rattler, an advanced man-portable antiarmor sytem in early development. Also in early development is the Advanced Strategic Missile Systems program being conducted by the Air Force, which involves R&D on re-entry vehicles and penetration aids for future ballistic weapons.

MISSILE PROGRAM PROCUREMENT INCLUDING INITIAL SPARES[a]

Fiscal Years 1981, 1982 and 1983
(Millions of Dollars)

Agency, Type and Model	1981		1982[E]		1983[E]	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
ALCM	480	$ 569.9	440	$ 597.1	440	$ 676.7
GLCM	11	164.1	54	350.5	120	530.7
IR Maverick	—	—	490	235.2	2,560	353.1
M-X	—	—	—	—	9	1,497.1
Minuteman II/III	—	140.8	—	111.2	—	—
Rapier	—	90.0	—	148.1	—	98.9
Target Drones[b]	—	48.8	—	99.2	—	136.3
NAVY						
Harm[c]	80	$ 126.9	254	$ 204.8	414	$ 354.6
Harpoon	240	219.2	240	234.3	231	266.7
Laser Maverick	—	—	—	5.0	90	33.1
Phoenix	210	161.0	72	163.0	108	270.8
Poseidon	—	26.2	—	18.7	—	9.7
Sidewinder[c]	1,500	150.1	2,500	189.9	2,420	158.8
Sparrow[c]	1,675	331.5	1,610	358.1	1,970	346.8
Standard ER (SM-2)	275	142.8	375	223.4	375	310.0
Standard MR (SM-1)	500	122.4	600	170.2	650	260.8
Standard MR (SM-2)	70	40.5	120	62.7	150	125.0
Tomahawk	50	190.0	88	236.3	120	308.4
Trident I	72	830.0	72	906.3	72	742.8
ARMY						
Copperhead[d]	3,125	$ 117.6	4,550	$ 141.1	8,420	$ 204.5
Improved Hawk[d]	—	25.0	388	82.4	213	77.5
Laser Hellfire	—	25.7	680	116.1	3,971	250.3
MLRS	2,340	115.6	2,496	205.6	23,640	444.4
Patriot	130	462.2	176	755.1	376	881.0
Pershing II	—	2.3	21	221.6	91	508.6
Roland	110	425.0	—	50.6	—	61.3
Stinger[d]	1,415	101.0	3,032	232.8	3,816	330.3
TOW[d]	12,000	100.9	14,666	141.9	13,000	174.1

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).
E Estimate.
a Total Obligational Authority.
b Includes Army, Navy and Air Force procurement.
c Includes Navy and Air Force procurement.
d Includes Army and Marine Corps procurement.

MAJOR MISSILES
RESEARCH, DEVELOPMENT, PRODUCTION, OPERATION

Project	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
AIR-TO-AIR					
AMRAAM	USAF/USN	D	Hughes/Raytheon	—	Hughes/Raytheon
Falcon-4F/G	USAF	O	Hughes	Thiokol	Hughes
Phoenix-54A	USN	O	Hughes	Hercules	Hughes
Phoenix-54C	USN	P	Hughes	Hercules	Hughes
Sidewinder-9G	USN	O	NASC	Bermite/Hercules	Raytheon
Sidewinder-9H	USN	O	Ford/Raytheon	Bermite/Hercules	Ford Aerospace
Sidewinder-9J	USAF	O	Ford Aerospace	Hercules/Aerojet	Ford Aerospace
Sidewinder-9L	USN/USAF	P,O	NASC/Raytheon/Ford	Bermite	Raytheon/Ford Aero.
Sidewinder-9M	USN/USAF	P	NASC/Ford/Raytheon	Thiokol	Raytheon/Ford Aero.
Sidewinder-9N	USAF	O	Ford Aero.	—	Ford Aero.
Sidewinder-9P	USAF	P,O	Ford Aero.	—	Ford Aero.
Sparrow-7E	USN/USAF	P,O	Raytheon	Hercules/Aerojet	Raytheon
Sparrow-7F	USN/USAF	P,O	Raytheon/GD	Hercules	Raytheon/GD
Sparrow-7M	USN/USAF	D,P	Raytheon/GD	Hercules	Raytheon
AIR-TO-SURFACE					
ALCM	USAF	P	Boeing	Williams International	McDonnell Douglas
HARM	USN/USAF	D	Texas Instr.	Thiokol	Texas Instr.
Harpoon*	USN	P,O	McDonnell Douglas	Teledyne CAE	TI/IBM/LSI Northrop
GBU-15	USAF	D	Rockwell	—	Rockwell
Maverick-65A/B	USAF	P, O	Hughes	Thiokol/Aerojet	Hughes
Maverick-65D	USAF	D	Hughes	Thiokol/Aerojet	Hughes
Maverick-65E	USMC	D	Hughes	Thiokol/Aerojet	Hughes
Maverick-65F	USN	D	Hughes	Thiokol/Aerojet	Hughes
Shrike	USN/USAF	O	NWC/PMTC	Aerojet/Hercules	Texas Instruments
SRAM	USAF	O	Boeing	Lockheed	Singer
Standard ARM	USN/USAF	O	GD	NOSIH	GD
Tomahawk 2	USN/USAF	D	General Dynamics	Teledyne CAE	McDonnell Douglas
Walleye 1	USN	O	Martin Marietta/Hughes	—	Martin Marietta/Hughes
Walleye 1ER	USN	R,D	NAC	—	NAC
Walleye 2	USN	O	NAC	—	NAC

* Also Surface-to-Surface

(Continued on next page)

MAJOR MISSILE PROJECTS (Continued)

Project	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
AIR TO SURFACE (Cont'd.)					
Walleye 2 (ER/DL)	USN	O	NAC	—	NAC
Wasp	USAF	D	Boeing/ Hughes	Atlantic Res./ Hercules	Sperry/ Hughes
ANTI-SUBMARINE					
Subroc	USN	O	Goodyear Aerospace	Thiokol	Singer
SURFACE-TO-AIR					
Chaparral	Army	O	Ford Aerospace	Hercules/ Bermite	GE/Raytheon
Improved Chaparral	Army	P,O	Ford Aerospace		Ford Aerospace
Improved Hawk	Army/ USMC	P,O	Raytheon	Aerojet	Raytheon
Patriot	Army	P	Raytheon	Thiokol	Raytheon
RAM	USN	D	General Dynamics	Bermite/ Hercules	General Dynamics
Redeye	Army	O	General Dynamics	Atlantic Research	General Dynamics
Roland	Army	P	Hughes/ Boeing	Hercules	Hughes/ Boeing
Sea Sparrow	USN	O	Raytheon	Aerojet/ Hercules	Raytheon
Standard MR (SM-1)	USN	P,O	General Dynamics	Aerojet/ Hercules	General Dynamics
Standard MR (SM-2)	USN	P,O	General Dynamics	Aerojet/ Hercules	General Dynamics
Standard ER (SM-1)	USN	P,O	General Dynamics	Atlantic Research	General Dynamics
Standard ER (SM-2)	USN	P,O	General Dynamics	Atlantic Research	General Dynamics
Stinger	Army/ USMC	P,O	General Dynamics	Atlantic Research	General Dynamics
Talos	USN	P,O	Bendix	Bendix	Bendix
Tartar	USN	O	GD	Aerojet	GD
Terrier	USN	O	General Dynamics	Atlantic Research	General Dynamics
SURFACE-TO-SURFACE					
Minuteman 2	USAF	O	AFLC Hill AFB	Thiokol/ Aerojet/ Hercules	Rockwell Autonetics
Minuteman 3	USAF	O	AFLC Hill AFB	Thiokol/ Aerojet	Rockwell Autonetics

(Continued on next page)

MAJOR MISSILE PROJECTS (Continued)

Project	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
SURFACE-TO-SURFACE (Cont'd.)					
MX	USAF	R,D	BMO/TRW	Thiokol/Aerojet/Hercules/Rocketdyne	Autonetics/Northrop
Polaris A3	USN	O	Lockheed MSC	Aerojet/Hercules	GE/Hughes/MIT/Raytheon
Poseidon C3	USN	O	Lockheed MSC	Thiokol/Hercules	GE/MIT/Raytheon/Hughes
Tomahawk (SLCM)	USN	P	General Dynamics	Williams International	McDonnell Douglas
Tomahawk (GLCM)	USAF	D	General Dynamics	Williams International	McDonnell Douglas
Titan 2	USAF	O	AFLC Hill AFB	Aerojet	GM/Delco Electronics
Trident C4	USN	P,O	Lockheed MSC	Hercules/Thiokol	GE/Draper/Raytheon/Hughes
BATTLEFIELD SUPPORT AND ANTIARMOR					
Copperhead	Army	P	Martin Marietta	—	—
Dragon	Army	P,O	Raytheon/Kollsman	MDD/Hercules/Raytheon	Raytheon
Hellfire	Army	P	Rockwell	Thiokol	Martin Marietta
Lance	Army	O	Vought	RI/Rocketdyne	E-Systems/Sys-Donner/Arma
MLRS	Army	D,P	Vought	Atlantic Res.	—
Pershing 1A	Army	O	Martin Marietta	Thiokol	Bendix
Pershing 2	Army	D,P	Martin Marietta	Hercules	Goodyear Aerospace
Shillelagh	Army	O	Ford Aerospace	Hercules	Ford Aerospace
TOW	Army/USMC	P,O	Hughes	Hercules	Emerson Electric

Source: Aerospace Industries Association, based on information from "Aviation Week & Space Technology Magazine."

Status: R—Research; D—Development; P—Production; O—Operational.

Abbreviations:
AFB - Air Force Base
AFLC - Air Force Logistics Cmd.
BMO - Ballistic Missile Office
GD - General Dynamics
GE - General Electric
LSI - Lear Siegler
MDD - McDonnell Douglas
MIT - Massachusetts Institute of Technology
NAC - Naval Avionics Center
NASC - Naval Air Systems Command
NWC - Naval Weapons Center
PMTC - Pacific Missile Test Center
RI - Rockwell International
TI - Texas Instruments
USAF - United States Air Force
USMC - United States Marine Corps
USN - United States Navy

DEPARTMENT OF DEFENSE OUTLAYS FOR MISSILES

Fiscal Years 1960-1983
(Millions of Dollars)

Year	TOTAL MISSILE OUTLAYS	Procurement	Research, Development, Test and Evaluation
1960	$ 5,086	$ 3,027	$ 2,059
1961	5,997	2,972	3,025
1962	6,219	3,442	2,777
1963	6,058	3,817	2,241
1964	5,929	3,577	2,352
1965	3,997	2,096	1,901
1966	3,870	2,069	1,801
1967	4,432	1,930	2,502
1968	4,741	2,219	2,522
1969	4,919	2,509	2,410
1970	5,108	2,912	2,196
1971	5,148	3,140	2,008
1972	5,166	3,009	2,157
1973	5,061	3,023	2,038
1974	5,141	2,981	2,160
1975	5,065	2,889	2,176
1976	4,591	2,296	2,295
Tr. Qtr.	922	402	520
1977	5,040	2,781	2,259
1978	NA	1,794	NA
1979	NA	2,084	NA
1980	NA	2,461	NA
1981	NA	3,513	NA
1982[E]	NA	4,437	NA
1983[E]	NA	6,262	NA

Source: Department of Defense Budget (Annually).
E Estimate.
NA Not Available.

DEPARTMENT OF DEFENSE OUTLAYS FOR MISSILE PROCUREMENT

By Agency
Fiscal Years 1960-1983
(Millions of Dollars)

Year	TOTAL MISSILE PROCUREMENT	Air Force	Navy	Army
1960	$ 3,027	$ 2,021	$ 423	$ 583
1961	2,972	1,922	493	557
1962	3,442	2,385	593	464
1963	3,817	2,676	718	423
1964	3,577	2,100	981	496
1965	2,096	1,320	522	254
1966	2,069	1,313	512	244
1967	1,930	1,278	432	220
1968	2,219	1,388	436	395
1969	2,509	1,382	534	593
1970	2,912	1,467	702	743
1971	3,140	1,497	791	852
1972	3,009	1,334	831	844
1973	3,023	1,454	628	941
1974	2,981	1,537	541	903
1975	2,889	1,602	615	672
1976	2,296	1,549	584	163
Tr. Qtr.	402	347	148	(93)
1977	2,781	1,502	905	374
1978	1,794	1,376	NA	418
1979	2,084	1,537	NA	547
1980	2,461	1,810	NA	651
1981	3,513	2,367	NA	1,146
1982^{E}	4,437	2,934	NA	1,503
1983^{E}	6,262	4,178	NA	2,084

Source: Department of Defense Budget (Annually).
E Estimate.
NA Not Available.

SALES AND BACKLOG
MISSILE SYSTEMS AND PARTS

Calendar Years 1968-1981
(Millions of Dollars)

Year	Missile Systems and Parts[a]	
	Net Sales	Backlog December 31
CURRENT DOLLARS		
1968	2,812	3,218
1969	2,676	2,511
1970	2.826	2,721
1971	2,641	3,344
1972	3,335	3,642
1973	3,391	3,868
1974	3,454	4,473
1975	3,548	4,580
1976	3,237	4,379
1977	3,118	4,541
1978	3,264[b]	4,581
1979	3,706	4,916
1980[r]	3,971	5,539
1981	4,661	5,544
CONSTANT DOLLARS (1972 = 100)[c]		
1968	3,407	3,899
1969	3,083	2,893
1970	3,090	2,975
1971	2,751	3,483
1972	3,335	3,642
1973	3,208	3,660
1974	3,006	3,892
1975	2,826	3,648
1976	2,450	3,315
1977	2,230	3,248
1978	2,175	3,053
1979	2,277	3,020
1980	2,239	3,123
1981	2,406	2,862

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] Prior to 1980, includes space vehicle systems and parts sold to other than U.S. Government customers.

[b] AIA estimate based on MQ37D.

[c] Based on GNP implicit price deflator.

[r] Revised.

SALES AND BACKLOG ENGINES AND PROPULSION UNITS FOR MISSILES AND SPACE VEHICLES

Calendar Years 1968-1981
(Millions of Dollars)

Year	Net Sales			Backlog, December 31		
	TOTAL	Military[a]	Non-Military	TOTAL	Military[a]	Non-Military
CURRENT DOLLARS						
1968	907	676	231	535	406	129
1969	702	667	35	497	485	12
1970	640	398	242	617	610	7
1971	605	596	9[r]	520	513	7
1972	607	596	11	671	659	12
1973	627	607	20	625	615	10
1974	649	633	16	678	662	16
1975	643	626	17	531	517	14
1976	641	621	20	673	659	14
1977	787	757	30	613	595	18
1978	792	760	32	788	754	34
1979	952	915	37	1,024	980	44
1980[r]	939	661	278	1,219	853	366
1981	1,167	774	393	1,293	800	493
CONSTANT DOLLARS (1972 = 100)[b]						
1968	1,099	819	280	648	492	156
1969	809	769	40	573	559	14
1970	700	435	265	675	667	8
1971	630	621	9	542	534	7
1972	607	596	11	671	659	12
1973	593	574	19	591	582	9
1974	565	551	14	590	576	14
1975	512	499	14	423	412	11
1976	485	470	15	509	499	11
1977	563	541	21	438	426	13
1978	528	506	21	525	502	23
1979	585	562	23	629	602	27
1980	529	373	157	687	481	206
1981	602	400	203	667	413	255

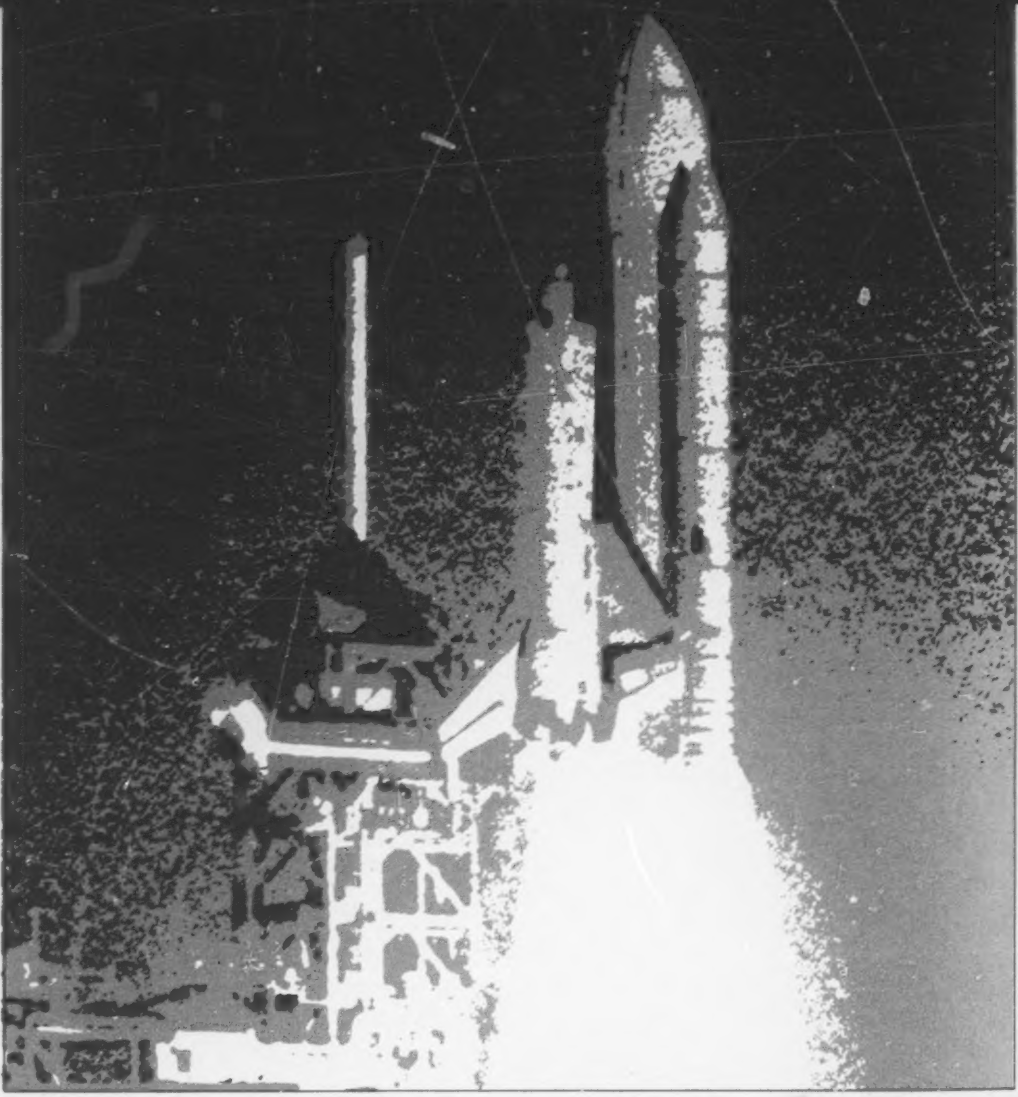
Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] Prior to 1980, includes figures for nonmilitary U.S. Government customers.

[b] Based on GNP implicit price deflator.

[r] Revised.

Space Programs



United States space activity, as measured by federal budget authority, continued to gain momentum in Fiscal Year 1981. Total space budget authority for the Department of Defense, NASA and other government agencies approached $10 billion, up almost 15 percent over the previous year's $8.7 billion. The FY 1982 budget provided for a further increase of approximately 18 percent, to $11.7 billion.

The increased activity is due for the most part to a rapidly growing military space program. Where a decade ago military spending for space was about half NASA's space budget, the Department of Defense almost matched NASA's budget authority in FY 1981 and in FY 1982 surpassed NASA for the first time since 1960.

For FY 1981 space activities, NASA was authorized $5 billion and DOD $4.8 billion. In FY 1982, DOD's authorization is up 23.5 percent to $5.9 billion, compared with NASA's $5.6 billion. Funding for military space is expected to predominate in immediate future years as DOD moves into Space Shuttle operations and simultaneously expands its space communications, surveillance and warning, navigation, geodesy and meteorological programs. The Administration requested $8.5 billion for military space activities in FY 1983. The FY 1983 budget authority requested for NASA is $6.6 billion.

The U.S. conducted 18 successful spacecraft launches in 1981, five more than in the previous year, but well below the average annual launch rate for the 1970s. Worldwide space launches numbered 123, up from 105 in 1980. The Soviet Union made 97 successful launches, eight more than in the previous year; Japan launched three payloads, India and the European Space Agency two each and the People's Republic of China one. The all-time total of successful launchings reached 2,265 of which 1,436—more than 63 percent—were conducted by the Soviet Union. The U.S. total at year-end was 774.

The 18 U.S. launches of 1981, 13 of them by NASA, boosted 20 payloads (two flights orbited dual payloads). Counted as payloads were the experimental equipment packages aboard the first two orbital test flights of the Space Shuttle; other payloads included seven DOD satellites, five commercial communications satellites, three scientific satellites, two weather satellites and one supplementary piggyback payload. Among the DOD programs, five were classified; the others were the first of three Nova navigation satellites and the fifth of the five-spacecraft Navy/USAF FLTSATCOM communications network.

The only NASA spacecraft launched in 1981 were three scientific satellites: two Dynamic Explorers intended to study the interaction of solar energy and magnetic forces in the atmosphere, and the Solar Mesosphere Explorer, designed to study reactions between solar energy, ozone and other atmospheric chemicals. The NASA-launched commercial communications satellites included two of the International Telecommunications Satellite Organization's Intelsat V series; a Comstar domestic satellite launched for Comsat General Corporation; the second of the Satellite Business System series; and the fourth of the RCA Satcom domestic satellites. NASA also launched, for the National Oceanic and Atmospheric Administration (NOAA), the fifth of the GOES weather satellites and the seventh spacecraft of the operational NOAA environmental satellite system.

Chief among space programs in development status at year-end 1981 was the NASA/DOD Space Shuttle, scheduled for first operational service late in 1982. Other NASA developments included the Space Telescope, an advanced astronomical observatory scheduled for 1985 launch; the advanced Landsat family of Earth resources monitoring satellites, first of which was slated for 1982 launch; Galileo, a Jupiter orbiter/probe scheduled for 1985 launch; and the Gamma Ray Observatory (1988 launch). Among the unclassified military space programs were the Navstar Global Positioning System, to be fully operational in 1985; the third generation Defense Satellite Communications System III; and the highly advanced Milstar extremely high frequency communications satellite system.

U.S. SPACECRAFT RECORD[a]

Calendar Years 1957-1981

Year	Earth Orbit[b]		Earth Escape[b]		Year	Earth Orbit[b]		Earth Escape[b]	
	Success	Failure	Success	Failure		Success	Failure	Success	Failure
1957	0	1	0	0	1970	36	1	3	0
1958	5	8	0	4	1971	45	2	8	1
1959	9	9	1	2	1972	33	2	8	0
1960	16	12	1	2	1973	23	2	3	0
1961	35	12	0	2	1974	27	2	1	0
1962	55	12	4	1	1975	30	4	4	0
1963	62	11	0	0	1976	33	0	1	0
1964	69	8	4	0	1977	27	2	2	0
1965	93	7	4	1	1978	34	2	7	0
1966	94	12	7	1[c]	1979	18	0	0	0
1967	78	4	10	0	1980	16	4	0	0
1968	61	15	3	0	1981	20	1	0	0
1969	58	1	8	1	TOTAL	977	134	79	15

Source: NASA, "Aeronautics and Space Report of the President," (Annually).

[a] Payloads, rather than launchings; some launches account for multiple spacecraft. Includes spacecraft from cooperating countries launched by U.S. launch vehicles.

[b] The criterion of success or failure used is attainment of earth orbit or earth escape rather than judgment of mission success. "Escape" flights include all that were intended to go at least an altitude equal to lunar distance from the earth.

[c] This earth-escape failure did attain earth orbit and therefore is included in the earth-orbit success totals.

WORLDWIDE SPACE LAUNCHINGS WHICH ATTAINED EARTH ORBIT OR BEYOND[a]

Calendar Years 1957-1981

Country	Total 1957-1981	1977	1978	1979	1980	1981
TOTAL	2,265	124	124	106	105	123
U.S.S.R.	1,436	98	88	87	89	97
United States	774	24	32	16	13	18
Japan	20	2	3	2	2	3
People's Republic of China	9	—	1	—	—	1
European Space Agency	3	—	—	1	—	2
India	3	—	—	—	1	2
Other[b]	20	—	—	—	—	—

Source: National Aeronautics and Space Administration, "Aeronautics and Space Report of the President," (Annually).

[a] Number of launchings rather than spacecraft; some launches orbited multiple spacecraft.

[b] Includes 10 by France, 8 by Italy, 1 by Australia, and 1 by the United Kingdom.

U.S. MAJOR LAUNCH RECORD

Calendar Year 1981

Launch Date, Spacecraft, and Launch Vehicle	Objectives and Remarks
Feb. 21 Comstar D-4 Atlas-Centaur	COMMUNICATIONS SATELLITE: to provide communications to 50 states and Puerto Rico. Can carry more than 14,000 two-way high quality voice circuits. Last in a series of four domestic communications satellites launched by NASA for Comsat General Corp. Leased to AT&T.
Feb. 28 Defense Titan IIIB-Agena D	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced. Reentered June 20.
Mar. 16 Defense Titan III	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
Apr. 12 Columbia (STS-1) Space Shuttle	First of four planned orbital flight tests of Space Transportation System. Demonstrated safe ascent and return of Orbiter and crew; carried payload of development flight instrumentation; tested cargo bay doors; proved thermal protection system (TPS). First use of liquid- and solid-fueled rocket engines for launch of manned mission. First post-orbital aircraft-type landing for reuse. Space Shuttle consists of (a) reusable manned Orbiter (size of DC-9 aircraft, designed to carry payload of 29,500 kg in cargo bay; 3 liquid-fueled rocket engines); (b) external tank (ET), only non-reusable part of Shuttle, jettisoned prior to achieving orbit; and (c) two solid-fueled rocket boosters (SRBs), dropped after ascent and recovered for reuse.
Apr. 28 Defense Titan IIIB-Agena D	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
May 15 Nova 1 Scout	NAVIGATION SATELLITE: to enable Navy to provide worldwide positional data to military and commercial users. First of a series of improved satellites launched by NASA for TRANSIT Navy Navigational Satellite System, for DOD. Still in orbit.
May. 22 GOES 5 Thor-Delta	WEATHER OBSERVATION SATELLITE: to provide near-continual, high-resolution, visual and infrared imaging over North and South America and surrounding oceans; to continue demonstration and validation of temperature and moisture soundings. Launched by NASA for National Oceanic and Atmospheric Administration (NOAA); fifth operational spacecraft funded by NOAA; second of three satellites to replace intial three operational satellites.

(Continued on next page)

U.S. MAJOR LAUNCH RECORD, 1981 (Continued)

Launch Date, Spacecraft, and Launch Vehicle	Objectives and Remarks
May 23 Intelsat V F-1 Atlas-Centaur	COMMUNICATIONS SATELLITE: to provide 12,000 voice circuits plus two television channels simultaneously, to be positioned over Atlantic Ocean. Second in series of nine satellites; launched by NASA for 106-member-nation International Telecommunications Satellite Organization (INTELSAT).
June 23 NOAA 7 Atlas F	WEATHER OBSERVATION SATELLITE: to make dependable daytime and nighttime meteorological observations of the earth. Launched by NASA for NOAA; third in a series of operational environmental monitoring satellites; joined NOAA 6 in orbit as part of two-satellite operating system.
Aug. 3 Dynamic Explorer 1 Dynamic Explorer 2 Thor-Delta	SCIENTIFIC SATELLITES: to study interaction between earth's magnetosphere, ionosphere, and atmosphere in higher (DE-1) and lower (DE-2) regions. Dual launch; mission success relies on correlative sets of measurements from two satellites. Both satellites returning data, although from lower final orbits than predicted; returned first color views from space of auroras of North and South Poles.
Aug. 6 Fltsatcom 5 Atlas-Centaur	COMMUNICATIONS SATELLITE: fifth of five planned satellites launched by NASA for Navy, to serve DOD via USAF narrowband and wide-band communications and USN fleet-relay and broadcast channels. Providing limited communications after structural damage received during orbital insertion.
Sept. 3 Defense Titan IIID	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced; still in orbit.
Sept. 24 SBS 2 Thor-Delta	COMMUNICATIONS SATELLITE: to provide integrated, all-digital, interference-free transmission of telephone, computer, electronic mail, and video teleconferencing to business clients of Satellite Business Systems (SBS). Second of four domestic communications satellites built for SBS, launched by NASA. Commercial operations began Dec. 15.

(Continued on next page)

U.S. MAJOR LAUNCH RECORD, 1981 (Continued)

Launch Date, Spacecraft, and Launch Vehicle	Objectives and Remarks
Oct. 6 SME and UOSAT (Oscar 9) Thor-Delta	SCIENTIFIC SATELLITES: dual launch of NASA's Solar Mesosphere Explorer (SME) and amateur scientific satellite developed by University of Surrey, United Kingdom (Oscar). SME to study reactions between sunlight, ozone, and other chemicals in atmosphere and how concentrations of ozone are transported in the region from 30 to 90 km altitude; instruments returning data for first comprehensive study of creation and destruction of ozone. Oscar to provide radio amateurs and educational institutions with operational satellite usable with minimal ground station for studying ionosphere and radio propagation conditions; designed to transmit scientific data and pictures of earth's surface for display on domestic TV set.
Oct. 31 Defense Titan IIIC	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced; still in orbit.
Nov. 12 Columbia (STS-2) Space Shuttle	Second of four planned orbital flight tests of initial Space Transportation System. Demonstrated (a) reusability of Orbiter; (b) launch, in-orbit, and reentry performance under conditions more demanding than for STS-1; and (c) Orbiter capability to support scientific and applications research with attached payload. Remote manipulator system (RMS) checked out; arm performed well but could not be cradled in backup mode. Fuel-cell problem developed after Shuttle entered orbit; shortened planned five-day mission to minimal mission of 36 orbits. Landed on runway 23 (dry lakebed landing facility) at Edwards AFB and returned to Kennedy Space Center for refurbishment for next flight.
Nov. 20 RCA Satcom 3R Thor-Delta	COMMUNICATIONS SATELLITE: to provide television, voice channels, and high-speed data transmission to 50 states and Puerto Rico, and to provide video programming to cable television (CATV) systems throughout the U.S. Launched by NASA; fourth in a series of RCA commercial communications satellites; replaces RCA Satcom 3 lost in space in late 1979.
Dec. 15 Intelsat V F-3 Atlas-Centaur	COMMUNICATIONS SATELLITE: to provide 12,000 voice circuits plus two television channels simultaneously, to be positioned over Atlantic Ocean. Third in series of nine satellites; launched by NASA for 106-member-nation International Telecommunications Satellite Organization (INTELSAT).

Source: NASA, "Aeronautics and Space Report of The President" (Annually) and NASA Historian's Office.
NOTE: Includes government and commercial payloads carried by all rocket vehicles larger than sounding rockets launched into orbit by NASA and DOD.

U.S. SPACE LAUNCH VEHICLES AS OF 1981

Vehicle and Initial Launch & First Launch of this Modification	Stages	Thrust (Kilonewtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Geo-synch.-Transfer Orbit	Circular Sun-Synch. Orbit
Scout (1960; 1979)	1. Algol IIIA* 2. Castor IIA* 3. Antares IIIA* 4. Altair IIIA*	431.1 285.2 83.1 25.6	255 205[b]	—	155[b]
Delta 2900 Series (Thor-Delta) (1960; 1973)	1. Thor plus 9 TX 354-5* 2. Delta 3. TE 364-4*	912.0 147[c] 44.2 65.8	2,000 1,410[b]	705	1,250[b]
Delta 3900 Series (Thor-Delta) (1960; 1982)	1. Thor plus 9 TX 526-2* 2. Delta 3. TE 364-4*	912.0 375[c] 44.2 65.8	3,045 2,180[b]	1,275	2,135[b]
Atlas E/F-TE 364-4 (1967; 1972)	1. Atlas booster & sustainer 2. TE 364-4*	1,722.0 65.8	2,090[b,d]	—	1,500[b]
Atlas-Centaur (1962)	1. Atlas booster & sustainer 2. Centaur	1,913.0 146.0	5,680	2,045	—
Vehicle and Launch Date	**Stages**	**Thrust (Kilonewtons)**	**185-Km Orbit**	**Direct Geo-synch Orbit**	**Sun-Synch. Transfer Orbit**
Titan IIIB-Agena (1966)	1. LR-87 2. LR-91 3. Agena	2,341.0 455.1 71.2	3,600[b]	—	3,060[b]
Titan IIIC (1965)	1. Two-segment 3.05-m. dia.* 2. LR-87 3. LR-91 4. Transtage	10,675.2 2,341.0 455.0 69.8	13,245	1,610[b]	—
Titan IIID (1971)	Same as Titan IIIC without Transtage		11,020[b]	—	9,750[b]

(Continued on next page)

U.S. SPACE LAUNCH VEHICLES AS OF 1981 (Continued)

Vehicle and Launch Date	Stages	Thrust (Kilonewtons)	Maximum Payload (Kg)[a]		
			185-Km. Orbit	Direct Geosynch. Orbit	Sun-Synch. Transfer Orbit
Titan III (34)D *(e)*	1. Two 5½-segment 3.05-m. dia* 2. LR-87 3. LR-91	11,564.8 2,366.3 449.3	12,520[b]	—	11,340[b]
Titan III (34) D/IUS (1982)	Same as Titan III (34)D plus: 4. IUS 1st stage* 5. IUS 2nd stage*	 275.8 115.7	14,920	1,850[b]	—
Titan III (34)D Transtage *(f)*	Same as Titan III (34)D plus: 4. Transtage	 69.8	14,920	1,855[b]	—
Space Shuttle (reusable) (1981)	1. Orbiter; 3 main engines (SSMEs) fire in parallel with SRBs 2. Two solid-fueled rocket boosters (SRBs) mounted on external tank (ET) fire in parallel with SSMEs	1,670[c] 11,790[c]	29,500 in full performance configuration (280-420 km orbit)		

Source: NASA, "Aeronautics and Space Report of the President" (Annually) and NASA Historian's office.

* Solid propellant; all others are liquid.

[a] Due east launch except as indicated.

[b] Polar launch.

[c] Each.

[d] With dual TE 364-4.

[e] Initial operational capability in December 1981; launch to be scheduled as needed.

[f] Initial operational capability in December 1982, launch to be scheduled as needed.

U.S. MANNED SPACE FLIGHT LOG

Calendar Years 1961-1981

Launch Date	Spacecraft and Crew	Flight Time (days:hrs:min)	Highlights
1961			
May 5	MR-3 (Shepard)	0:00:15	First U.S. flight; suborbital.
July 21	MR-4 (Grissom)	0:00:16	Suborbital; capsule sank after landing; astronaut safe.
1962			
Feb. 20	MA-6 (Glenn)	0:04:55	First American to orbit.
May 24	MA-7 (Carpenter)	0:04:56	Landed 400 km. beyond target.
Oct. 3	MA-8 (Schirra)	0:09:13	Landed 8 km. from target
1963			
May 15	MA-9 (Cooper)	1:10:20	First U.S. flight exceeding 24 h.
1965			
Mar. 23	Gemini 3 (Grissom, Young)	0:04:53	First U.S. 2-man flight; first manual maneuvers in orbit.
June 3	Gemini 4 (McDivitt, White)	4:01:56	21-min extravehicular activity (White).
Aug. 21	Gemini 5 (Cooper, Conrad)	7:22:55	Longest-duration manned flight to date.
Dec. 4	Gemini 7 (Borman, Lovell)	13:18:25	Longest-duration manned flight to date.
Dec. 15	Gemini 6-A (Schirra, Stafford)	1:01:51	Rendezvous within 30 cm of Gemini 7.
1966			
Mar. 16	Gemini 8 (Armstrong, Scott)	0:10:41	First docking of two orbiting spacecraft (Gemini 8 with Agena target rocket).
June 3	Gemini 9-A (Stafford, Cernam)	3:00:21	Extravehicular activity, rendezvous.
July 18	Gemini 10 (Young, Collins)	2:22:47	First dual rendezvous (Gemini 10 with Agena 10, then Agena 8).
Sept. 12	Gemini 11 (Conrad, Gordon)	2:23:17	First initial-orbit docking; first tethered flight; highest earth-orbit altitude (1372 km).
Nov. 11	Gemini 12 (Lovell, Aldrin)	3:22:35	Longest extravehicular activity to date (Aldrin, 5 hr 37 min).

(Continued on next page)

U.S. MANNED SPACE FLIGHT LOG (Continued)

Calendar Years 1961-1981

Launch Date	Spacecraft and Crew	Flight Time (days:hrs:min)	Highlights
1968			
Oct. 11	Apollo 7 (Schirra, Eisele, Cunningham)	10:20:09	First U.S. 3-man mission
Dec. 21	Apollo 8 (Borman, Lovell, Anders)	6:03:01	First manned orbit(s) of moon; first manned departure from earth's sphere of influence; highest speed ever attained in manned flight.
1969			
Mar. 3	Apollo 9 (McDivitt, Scott, Schweickart)	10:01:01	Successfully simulated in earth orbit operation of Lunar Module to landing and take off from lunar surface and rejoining with Command Module.
May 18	Apollo 10 (Stafford, Young, Cernan)	8:00:03	Successfully demonstrated complete system including Lunar Module descent to 14,300 m. from lunar surface.
July 16	Apollo 11 (Armstrong, Collins, Aldrin)	8:03:09	First manned landing on lunar surface and safe return to earth. First return of rock and soil samples to earth, and manned deployment of experiments on lunar surface.
Nov. 14	Apollo 12 (Conrad, Gordon, Bean)	10:04:36	Second manned lunar landing. Explored surface of moon and retrieved parts of Surveyor 3 spacecraft, which landed in Ocean of Storms Apr. 19, 1967.
1970			
April 11	Apollo 13 (Lovell, Haise, Swigert)	5:22:55	Mission aborted; explosion in Service Module. Ship circled moon, with crew using LM as "lifeboat" until just before reentry.
1971			
Jan. 31	Apollo 14 (Shepard, Roosa, Mitchell)	9:00:02	Third manned lunar landing. Mission demonstrated pinpoint landing capability and continued manned exploration.

(Continued on next page)

U.S. MANNED SPACE FLIGHT LOG (Continued)

Calendar Years 1961-1981

Launch Date	Spacecraft and Crew	Flight Time (days:hrs:min)	Highlights
July 26	Apollo 15 (Scott, Worden, Irwin)	12:07:12	Fourth manned lunar landing and first Apollo "J" series mission; carried Lunar Roving Vehicle. Worden's in flight EVA of 38 min 12 sec performed during return trip.
1972			
April 16	Apollo 16 (Young, Duke, Mattingly)	11:01:51	Fifth manned lunar landing, with Lunar Roving Vehicle.
Dec. 7	Apollo 17 (Cernan, Schmitt, Evans)	12:13:52	Sixth and final Apollo manned lunar landing, again with roving vehicle.
1973			
May 25	Skyklab 2 (Conrad, Kerwin, Weitz)	28:00:50	Docked with Skylab 1 for 28 days. Repaired damaged station.
July 28	Skylab 3 (Bean, Lousma, Garriott)	59:11:09	Docked with Skylab 1 for more than 59 days.
Nov. 16	Skylab 4 (Carr, Gibson, Pogue)	84:01:16	Docked with Skylab 1 in long-duration mission; last of Skylab program
1975			
July 15	Apollo (ASTP) (Stafford, Slayton, Brand)	9:01:28	Docked with Soyuz 19 in joint experiments of Apollo Soyuz Test Program (ASTP) mission.
1981			
Apr. 12	STS-1 (Orbiter Columbia) (Young, Crippen)	2:06:21	First flight of Space Shuttle, tested spacecraft in orbit. First landing of airplanelike craft from orbit for reuse.
Nov. 12	STS-2 (Orbiter Columbia) Engle, Truly)	2:06:13	Second flight of Space Shuttle, first scientific payload. Tested remote manipulation arm. Returned for reuse.

Source: NASA, "Aeronautics and Space Report of The President" (Annually) and NASA Historian's Office.

SALES AND BACKLOG
SPACE VEHICLE SYSTEMS[a]

(Excluding Engines and Propulsion Units)
Calendar Years 1968-1981
(Millions of Dollars)

Year	Net Sales			Backlog, December 31		
	TOTAL	Military	Non-Military	TOTAL	Military	Non-Military
CURRENT DOLLARS						
1968	$ 2,357	$ 899	$ 1,458	$ 1,329	$ 834	$ 495
1969	2,282	1,187	1,095	1,330	869	461
1970	1,956	1,025	931	1,184	786	398
1971	1,725	860	865	916	603	313
1972	1,656	905	751	959	646	313
1973	1,562	902	660	1,177	923	254
1974	1,751	944	807	1,492	1,131	361
1975	2,119	1,096	1,023	1,304	1,019	285
1976	2,002	904	1,098	1,234	902	332
1977	1,870	814	1,056	1,589	1,263	326
1978	2,324	1,006	1,318	2,188	1,693	495
1979	2,539	1,105	1,434	1,448	909	539
1980[r]	3,483	1,461	2,022	1,814	951	863
1981	4,014	1,680	2,334	2,179	1,165	1,014
CONSTANT DOLLARS (1972 = 100)[b]						
1968	$ 2,856	$ 1,089	$ 1,766	$ 1,610	$ 1,010	$ 600
1969	2,629	1,368	1,262	1,532	1,001	531
1970	2,139	1,121	1,018	1,295	859	435
1971	1,797	896	901	954	628	326
1972	1,656	905	751	959	646	313
1973	1,478	853	624	1,114	873	240
1974	1,524	821	702	1,298	984	314
1975	1,688	872	815	1,039	812	227
1976	1,515	684	831	934	683	251
1977	1,337	582	755	1,136	903	233
1978	1,549	670	878	1,458	1,128	330
1979	1,560	679	881	890	558	331
1980	1,964	824	1,140	1,023	536	487
1981	2,072	867	1,205	1,125	601	523

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] Space vehicle systems and parts sold to other than U.S. Government customers included as of 1980; previously, this product group combined with missile systems and parts (see p. 55).

[b] Based on GNP implicit price deflator.

[r] Revised.

9

SPACE ACTIVITIES BUDGET AUTHORITY

Fiscal Years 1959-1982[a]
(Millions of Current Dollars)

Year	TOTAL	NASA[b]	DOD	Energy	Commerce	Other[c]
1959	$ 785	$ 261	$ 490	$ 34	$ —	$ —
1960	1,066	462	561	43	—	(d)
1961	1,808	926	814	68	—	1
1962	3,295	1,797	1,298	148	51	1
1963	5,435	3,626	1,550	214	43	2
1964	6,831	5,016	1,599	210	3	3
1965	6,956	5,138	1,574	229	12	3
1966	6,970	5,065	1,689	187	27	3
1967	6,710[r]	4,830	1,664	184	29	3
1968	6,529[r]	4,430	1,922	145	28	4
1969	5,976	3,822	2,013	118	20	3
1970	5,341	3,547	1,678	103	8	4
1971	4,741	3,101	1,512	95	27	5
1972	4,575	3,071	1,407	55	31	10
1973	4,825	3,093	1,623	54	40	15
1974	4,640	2,759	1,766	42	60	14
1975	4,914	2,915	1,892	30	64	13
1976	5,320	3,225	1,983	23	72	16
Tr. Qtr.	1,341	849	460	5	22	4
1977	5,983	3,440	2,412	22	91	18
1978	6,509	3,623	2,729	34	103	20
1979	7,419	4,030	3,211	59	98	21
1980	8,689	4,680	3,848	40	93	28
1981[E]	9,951	4,997	4,789	42	92	30
1982[E]	11,730	5,617	5,916	38	126	32

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
Note: Detail may not add to totals because of rounding.

[a] FY 1983 and revised FY 1982 estimates not available at time of publication.

[b] Excludes amounts for air transportation.

[c] Departments of Interior and Agriculture, and the National Science Foundation.

[d] Less than $500,000.

SPACE ACTIVITIES BUDGET AUTHORITY IN CONSTANT DOLLARS

Fiscal Years 1959-1982[a]
(Millions of Constant Dollars, 1972 = 100[b])

Year	TOTAL	NASA[c]	DOD	Energy	Commerce	Other[d]
1959	$ 1,152	$ 383	$ 719	$ 50	$ —	$ —
1960	1,537	666	809	62	—	(d)
1961	2,577	1,320	1,160	97	—	1
1962	4,616	2,518	1,818	207	71	1
1963	7,341	4,897	2,093	289	58	3
1964	9,226	6,775	2,160	284	4	4
1965	9,277	6,852	2,099	305	16	4
1966	9,055	6,580	2,194	243	35	4
1967	8,443	6,078	2,094	232	36	4
1968	7,930	5,381	2,335	176	34	5
1969	6,935	4,435	2,336	137	23	3
1970	5,866	3,896	1,843	113	9	4
1971	4,958	3,243	1,581	99	28	5
1972	4,575	3,071	1,407	55	31	10
1973	4,620	2,962	1,554	52	38	14
1974	4,145	2,464	1,577	38	54	13
1975	3,993	2,369	1,537	24	52	11
1976	4,041	2,450	1,506	17	55	12
Tr. Qtr.	991	627	340	4	16	3
1977	4,257	2,447	1,716	16	65	13
1978	4,340	2,416	1,820	23	69	13
1979	4,555	2,474	1,972	36	60	13
1980	4,916	2,648	2,177	23	53	16
1981[E]	5,143	2,582	2,475	22	48	16
1982[E]	5,602	2,683	2,825	18	60	15

Source: AIA, derived from NASA, "Aeronautics and Space Report of the President," (Annually).

[a] FY 1983 and revised FY 1982 estimates not available at time of publication.

[b] Based on fiscal year GNP implicit price deflator.

[c] Excludes amounts for air transportation.

[d] Departments of Interior and Agriculture, and The National Science Foundation.

[E] Less than $500,000.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY

Fiscal Years 1960-1983
(Millions of Dollars)

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1960	$ 614	$ 333	$ 190	$ 91
1961	964	672	125	167
1962	1,825	1,285	326	214
1963	3,673	2,929	744	(a)
1964	5,099	3,890	713	496
1965	5,250	4,360	267	623
1966	5,175	4,502	61	612
1967	4,968	4,235	85	648
1968	4,589	3,912	38	639
1969	3,995	3,314	33	648
1970	3,749	2,993	53	703
1971	3,312	2,556	26	730
1972	3,308	2,523	53	732
1973	3,408	2,599	79	730
1974	3,040	2,194	101	745
1975	3,231	2,323	143	765
1976	3,552	2,678	82	792
Tr. Qtr.	932	700	11	221
1977	3,819	2,856	118	845
1978	4,064	3,012	162	890
1979	4,559	3,477	148	934
1980	5,243	4,088	159	996
1981	5,522	4,334	117	1,071
1982[E]	5,981	4,738	99	1,145
1983[E]	6,613	5,334	100	1,179

Source: "The Budget of the United States" (Annually); FY 81-83 from NASA FY 1983 Budget Briefing.
NOTE: Detail may not add to totals because of rounding.
a Included in Research & Development for one year.
E Estimate.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION OUTLAYS

Fiscal Years 1960-1983
(Millions of Dollars)

Year	TOTAL	Research and Development	Construction of Facilities	Research & Program Management
1960	$ 401	$ 256	$ 54	$ 91
1961	744	487	98	159
1962	1,257	936	114	207
1963	2,552	1,912	225	416
1964	4,171	3,317	438	416
1965	5,093	3,984	531	578
1966	5,933	4,741	573	619
1967	5,426	4,487	289	650
1968	4,724	3,946	126	652
1969	4,251	3,530	65	656
1970	3,753	2,992	54	707
1971	3,382	2,630	44	708
1972	3,422	2,623	50	749
1973	3,315	2,541	45	729
1974	3,256	2,421	75	760
1975	3,266	2,420	85	761
1976	3,669	2,749	121	799
Tr. Qtr.	952	731	26	195
1977	3,945	2,980	105	860
1978	3,983	2,989	124	870
1979	4,196	3,139	133	925
1980	4,852	3,702	140	1,010
1981	5,426	4,228	147	1,050
1982*E*	5,831	4,593	135	1,103
1983*E*	6,582	5,281	122	1,179

Source: "The Budget of the United States" (Annually).
NOTE: Detail may not add to totals because of rounding.
E Estimate.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION RESEARCH AND DEVELOPMENT PROGRAMS BUDGET AUTHORITY

Fiscal Years 1979-1983
(Millions of Dollars)

	1979	1980	1981	1982^{E}	1983^{E}
TOTAL	$ 3,477	$ 4,088	$ 4,334	$ 4,738	$ 5,334
Space Transportation—TOTAL	2,012	2,385	2,729	3,090	3,468
Space Shuttle	1,638	1,871	1,995	2,163	1,718
Space Flight Operations	300	447	679	896	1,707
Expendable Launch Vehicles	74	67	55	31	43
Space Science and Applications—TOTAL	789	945	882	902	1,002
Physics and Astronomy	283	337	324	323	472
Planetary Exploration	182	220	176	205	155
Life Sciences	40	44	42	40	56
Space Applications	275	332	332	326	316
Technology Utilization	9	12	9	8	4
Aeronautics and Space Technology—TOTAL	376	427	384	344	355
Aeronautical Research and Technology	264	308	271	233	232
Space Research and Technology	107	116	111	111	123
Energy Technology	5	3	2	—	—
Space Tracking and Data Systems—TOTAL	300	332	340	402	509

Source: "The Budget of the United States," (Annually).
NOTE: Detail may not add to totals because of rounding.
E Estim[illegible]

DEPARTMENT OF DEFENSE
SPACE AND SPACE-RELATED PROGRAMS[a]

Fiscal Years 1981-1983
(Millions of Dollars)

Program	1981	1982[E]	1983[E]
TOTAL	$ 4,797.1	$ 6,362.3	$ 8,451.7
Mission-Oriented—**TOTAL**	$ 1,218.2	$ 1,910.9	$ 2,646.6
Navigation	166.9	224.5	291.3
Communications	687.6	979.7	1,352.2
Warning	265.6	563.2	714.1
Mapping/Charting/Geodesy	11.6	29.2	53.1
Weather	86.5	114.3	235.9
Vehicle Development	758.5	863.8	1,110.4
Space Ground Support[b]	315.2	433.4	557.6
Supporting RDT&E[c]	586.1	755.2	972.5
General Support[d]	1,919.1	2,399.0	3,164.6

Source: Department of Defense, statement to Senate Subcommittee on Science, Technology, and Space.

[a] Total obligational authority.

[b] Includes range support, instrumentation, ground based satellite detection, tracking, and control.

[c] Includes research, exploratory and advanced development.

[d] Includes support organizations as well as general operational support.

[E] Estimate.

DEPARTMENT OF DEFENSE SPACE PROGRAMS[a] PROCUREMENT (INCLUDING INITIAL SPARES) AND RDT&E

Fiscal Years 1981, 1982 and 1983
(Millions of Dollars)

Agency and Program	1981		1982[E]		1983[E]	
	Procurement	RDT&E	Procurement	RDT&E	Procurement	RDT&E
AIR FORCE						
Afsatcom	$ 5.0	$ 25.9	$ —	$ 80.1	$ 28.6	$ 50.9
Defense Meteorological Satellite Program (DMSP)	42.8	18.9	36.6	47.2	167.9	27.8
Defense Satellite Communications System (DSCS)	80.5	35.1	129.6	40.1	192.9	53.1
Navstar Global Positioning System	—	126.2	—	165.4	102.0	122.8
*Space Defense System	—	133.9	—	200.9	—	213.5
Space Launch Support	0.7	15.0	103.0	20.2	155.8	16.4
Space Shuttle	117.0	246.3	200.7	266.0	136.0	355.6
Space Boosters	121.2	29.4	68.2	19.2	71.1	15.0
NAVY						
Fleet Satellite Communications (Fltsatcom)	$ 27.0	$ 1.6	$ 65.1	$ 1.3	$ 231.3	$ —
Navstar Global Positioning System	—	17.1	—	34.0	—	39.8
ARMY						
Navstar Global Positioning System	$ —	$ 17.8	$ —	$ —	$ —	$ 11.9

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually) and Office of the Comptroller, DOD.

[a] Total Obligational Authority.

[E] Estimate.

* Program in R&D only.

Air Transportation

In 1981, the U.S. scheduled airline industry experienced the worst financial losses in its history. Overall operating costs remained high despite some stabilization in fuel prices, the principal cost factor; fuel stayed above the dollar-a-gallon level. Airline deregulation contributed to excessive fare competition, hence to reduced revenues; revenues were further cut by a recession-induced decline in traffic volume. The end result for all domestic and international operations was a loss of $421 million, according to the Air Transport Association. The loss was not only the greatest ever, it was almost double the previous record operating loss of $222 million in 1980.

For the second consecutive year, after a decade of sharp increase, passenger traffic dipped. The scheduled U.S. carriers boarded 286 million passengers in 1981 and flew them 249 billion passenger miles. The figure compare with 297 million passengers flown 255 billion passenger miles in 1980. Cargo ton-miles—seven billion—remained at approximately the previous year's level.

Among other statistical highlights of the U.S. scheduled airlines' 1981 performance:

- Domestic flights accounted for 93 percent of all passengers boarded, compared with 92 percent a year earlier. The airlines carried 265 million passengers on domestic routes, a decline of about three percent from 1980.
- International traffic dropped more sharply. Passengers carried on international flights totaled less than 21 million, down more than 14 percent from 1980's 24 million.

U.S. air carriers, including operators other than scheduled airlines, were flying 3,973 aircraft at year-end 1981; the figure represents an increase of 168 planes over 1980. Turbojet airlines numbered 2,511, about 63 percent of the total. The fleet also included 852 turboprops and 605 piston-powered aircraft.

Worldwide commercial air traffic experienced a drop in passenger volume while cargo haulage edged up slightly. World scheduled airlines, excluding the Soviet Union, carried 619 million passengers, down four percent from the 645 million boarded in the previous year. In terms of passenger miles, however, the decline was negligible; the figure for 1981 is 574 billion passenger miles, which compares with 577 billion in 1980. Cargo ton-miles increased from 18.2 billion in 1980 to 18.8 billion in 1981.

When U.S.S.R. traffic is included, the number of passengers boarded in 1981 was down but revenue passenger miles were up. Passengers carried worldwide totaled 728 million, down less than three percent; passenger miles, at 679 billion, were up three billion. Cargo ton-miles increased by 600 million, or about three percent, and topped the 20 billion mark for the first time.

Despite the airlines' financial problems and the lack of traffic growth, the world fleet of turbine engine aircraft in commercial service increased significantly during 1980/81, according to Exxon International's annual survey. Excluding airplanes operated by the Soviet Union, the total number of aircraft in service at midyear 1981 was 8,726, up more than 700 units over 1980; fleet increases for three prior years had averaged fewer than 250 units. Of the 1981 total, 6,805 aircraft—70 percent— were turbojet-powered. There were 2,508 turboprops and 133 turbine-powered helicopters.

Planes of U.S. manufacture accounted for 85.3 percent of the jet-powered transports and 67.6 percent of the total world turbine engine aircraft fleet; the latter figure, however, was down from the 69.8 percent reported in the Exxon survey for 1980. Among the jetliners, the most widely used is the Boeing 727, 1,585 of which are in service. Other jet models in wide service include the McDonnell Douglas DC-9 (882 aircraft), the Boeing 737 (708), the Boeing 707 (547), the Boeing 747 (478), the McDonnell Douglas DC-8 (358), the McDonnell Douglas DC-10 (338), the Lockheed L-1011 TriStar (192), the B.Ae. 111 (159), and the European-built Airbus A300 (132).

WORLD AIRLINE TRAFFIC SCHEDULED SERVICES

Calendar Years 1970-1981
(Millions)

Year	Miles Flown	Passengers Carried	Passenger-Miles	Cargo Ton-Miles	Mail Ton-Miles
			Excludes U.S.S.R.		
1970	4,360	311	237,000	7,260[r]	1,880[r]
1971	4,390	333	252,000	7,880[r]	1,750
1972	4,490	368	289,000	9,060	1,660
1973	4,670[r]	404[r]	323,000	10,670[r]	1,700
1974	4,580	423	340,000[r]	11,630[r]	1,680
1975	4,670	436	357,000	11,820[r]	1,660
1976	4,870	476[r]	393,000[r]	13,240[r]	1,740
1977	5,030	517	430,000[r]	14,620	1,830
1978	5,280	581	495,000	16,170	1,880
1979	5,690[r]	652[r]	565,000[r]	17,580[r]	1,970
1980	5,870[r]	645[r]	577,000[r]	18,230[r]	2,120
1981[E]	5,720	619	574,000	18,770	2,190
			Includes U.S.S.R.		
1970	NA	382	286,000	8,280[r]	2,150[r]
1971	NA	411	307,000	9,060	1,990[r]
1972	NA	450	348,000	10,290	1,900
1973	NA	489	384,000[r]	12,010[r]	1,970
1974	NA	515	407,000	13,030	1,970
1975	NA	534	433,000	13,270[r]	1,990
1976	NA	576	475,000[r]	14,750[r]	2,080
1977	NA	610	508,000	16,180	2,180
1978	NA	679	582,000	17,770	2,240
1979	NA	754[r]	659,000[r]	19,180[r]	2,350
1980	NA	748[r]	676,000[r]	19,950[r]	2,520[r]
1981[E]	NA	728	679,000	20,550	2,600

Source: International Civil Aviation Organization, "Development of World Scheduled Revenue Traffic" (Annually).
NOTE: Excludes states which were not members of ICAO on December 31, 1981. Figures represent revenue traffic on international and domestic scheduled services.
r Revised.
E Estimate.
NA Not Available.

WORLD AIRLINE FLEET
TURBINE-ENGINED AIRCRAFT
By Model
1977-1981

	1977	1978	1979	1980	1981
TOTAL AIRCRAFT IN SERVICE	7,298	7,550	7,787	8,010	8,726
Number Manufactured in U.S.	5,027	5,159	5,341	5,590	5,900
Percent Manufactured in U.S.	68.9%	68.3%	68.6%	69.8%	67.6%
Turbojets—TOTAL	5,137	5,288	5,534	5,756	6,085
Aerospatiale Caravelle	141	131	111	102	119
Aerospatiale Corvette	25	22	19	13	11
Airbus A300	35	53	76	102	132
B.Ae. 111	164	164	162	158	159
B.Ae. HS-125	6	5	5	6	6
B.Ae. VC-10	22	17	17	6	1
B.Ae./Aerospatiale Concorde	8	9	9	13	14
B.Ae. Comet	16	10	7	4	—
B.Ae. Trident	93	99	97	64	86
Boeing 707/720	702	673	638	569	547
Boeing 727	1,228	1,315	1,427	1,560	1,585
Boeing 737	464	498	555	593	708
Boeing 747	291	308	349	420	478
Cessna Citation I/II	5	4	3	13	37
Convair 880/990	15	13	13	14	12
Dassault Falcon	45	47	36	33	45
Dassault Mercure	10	10	10	10	10
Fokker-VFW F.28	94	103	122	115	128
Gates Lejet	18	11	10	14	35
Gulfstream II/III	5	5	6	8	12
Ilyushin IL-62	26	32	39	41	39
Ilyushin IL-76	—	—	—	6	2
Israel Aircraft 1121/1124	—	—	—	—	5
Lockheed JetStar	1	1	1	1	4
Lockheed L-1011 TriStar	138	145	160	177	192
MBB Hansa HFB-320	—	—	—	6	5
McDonnell Douglas DC8	468	450	396	382	358
McDonnel Douglas DC-9	774	794	836	856	882
McDonnell Douglas DC-10	234	248	276	307	338
Rockwell Sabreliner	2	2	1	2	—
Tupolev Tu. 124	—	—	—	2	—
Tupolev Tu. 134	60	66	68	82	68
Tupolev Tu. 154	15	17	26	33	31
VFW-Fokker 614	5	11	12	2	5
Yakolev Yak-40/42	27	25	47	42	31

(Continued on next page)

WORLD AIRLINE FLEET
TURBINE-ENGINED AIRCRAFT (Continued)
By Model
1977-1981

	1977	1978	1979	1980	1981
Turboprops—TOTAL	1,856	1,931	2,013	2,059	2,508
Aerospatiale N.262 Mohawk 298	34	40	33	30	29
Antonov An.12	2	2	2	10	3
Antonov An.24/26	54	65	90	125	96
Antonov An.30	—	—	—	1	—
B.Ae. Britannia	26	14	9	10	12
B.Ae./HP Jetstream	7	8	6	3	17
B.Ae. Vanguard	22	24	23	11	8
B.Ae. Viscount	90	86	91	84	77
B.Ae. HS-748	122	138	133	141	144
Beech 99	111	110	118	107	123
Beech 90 King Air	14	19	11	15	16
Beech 200 King Air	—	—	—	—	20
Beech 18-TP Conv.	6	6	6	5	—
Canadair CL-44	24	24	17	12	10
CASA/Nurtanio C-212	2	6	9	9	34
Cessna 400 Srs. TP Conv.	—	1	1	2	—
Cessna 441 Conquest	—	—	—	—	2
Convair 580/600/640	103	104	121	132	147
Douglas DC-3	—	—	3	—	—
DHC-2 Turbo Beaver	11	7	14	11	8
DHC-6 Twin Otter	308	335	327	321	456
DHC-7 Dash 7	—	4	8	18	38
Embraer EMB-110 Bandeirante	43	49	61	60	157
Fokker-VFW F.27/ Fairchild F.27 & FH.227	354	370	364	363	402
GAF Nomad	3	6	10	9	34
Grumman Gulfstream I	3	—	—	8	16
Grumman Mallard	1	—	—	—	1
Grumman Turbo Goose	2	2	2	3	2
Handley Page Herald	29	32	36	34	31
Hawker-Siddeley Argosy	7	8	9	8	5
Ilyushin IL-18	84	72	82	79	61
LET L-410	12	12	11	11	11
Lockheed L-188 Electra	96	87	86	89	96
Lockheed L-100 Hercules	40	36	44	41	48
Mitsubishi MU-2	17	15	15	10	13
NAMC YS-11	125	126	121	112	117

(Continued on next page)

WORLD AIRLINE FLEET
TURBINE-ENGINED AIRCRAFT (Continued)
By Model
1977-1981

	1977	1978	1979	1980	1981
Turboprops (continued)					
Pilatus Turbo Porter	10	12	12	7	5
Piper Cheyenne I/III	1	2	1	1	6
Rockwell Turbo Commander	2	1	2	1	12
Saunders ST-27	4	2	2	11	5
Shorts Skyliner/Skyvan	32	29	21	22	29
Shorts 330	—	—	26	36	63
Swearingen Merlin	—	—	—	3	6
Swearingen Metro	31	47	81	108	143
Transall C-160	—	—	—	—	5
Other	18	24	5	—	—
Turbine-Powered Helicopters—TOTAL	305	331	240	195	133
Aerospatiale SA-315 Lama	—	8	—	—	2
Aerospatiale SA-318 Alouette	25	26	21	7	7
Aerospatiale SA-321 Super Frelon	1	—	—	1	—
Aerospatiale SA-330 Puma	20	20	20	17	3
Aerospatiale SA-332 Super Puma	—	—	—	—	1
Aerospatiale SA-341 Gazelle	—	—	—	—	1
Aerospatiale SA-360 Dauphin	—	—	—	—	7
Bell 204	8	9	9	5	4
Bell 205	31	27	4	1	—
Bell 206	71	79	50	26	7
Bell 212	10	15	11	7	5
Bell 222	—	—	1	—	—
Bell (Fuji) 214	—	1	1	4	3
Boeing Vertol 234 Chinook	—	—	—	—	1
Hughes (Kawasaki) 500	74	76	63	72	24
M.B.B. Bo. 105	6	6	5	4	11
Mil Mi-8	—	—	—	3	—
Sikorsky S-55T	1	2	3	—	3
Sikorsky S-58T	14	12	10	8	9
Sikorsky S-61	39	45	38	35	34
Sikorsky S-62	2	2	—	—	1
Sikorsky S-64	3	3	—	—	1
Sikorsky S-76	—	—	4	5	9

Source: Exxon International Company, "Air World Survey," (Annually).

NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and covers aircraft in service on June 30. Excludes air taxi operators. Effective 1979, excludes a number of companies operating smaller types of aircraft and not providing scheduled services.

AIRLINE TRAFFIC
U.S. SCHEDULED AIRLINES
Calendar Years 1960-1981
(Millions)

Year	Miles Flown	Passengers Carried	Passenger-Miles	Cargo Ton-Miles[a]
1960	998	58	38,863	1,130
1961	970	58	39,831	1,331
1962	1,010	63	43,760	1,738
1963	1,095	71	50,365	1,714
1964	1,189	82	58,494	2,017
1965	1,354	95	68,676	2,764
1966	1,482	109	79,889	3,810
1967	1,834	132	98,484	4,522
1968	2,146	150	113,958	5,140
1969	2,385	159	125,414	5,788
1970	2,418	170	131,710	5,346
1971	2,379	174	135,652	5,964
1972	2,376	191	152,406	6,403
1973	2,448	202	161,957	6,492
1974	2,258	207	163,919	6,495
1975	2,241	205	162,810	6,200
1976	2,320	223	178,988	6,525
1977	2,419	240	193,219	6,976
1978	2,520	275	226,781	7,001
1979	2,791	317	262,023	7,189
1980[r]	2,816	297	255,192	7,084
1981	2,700	286	248,757	7,058

Source: Civil Aeronautics Board, Information Management Division.

NOTE: Figures represent total domestic and international scheduled service excluding nonrevenue operations of U.S. certificated route air carriers.

[a] Includes freight express, and U.S. and foreign mail ton-miles in scheduled operations.

[r] Revised.

PASSENGER SERVICE
U.S. SCHEDULED AIRLINES

Calendar Years 1960-1981

Year	Domestic		International	
	Passenger Miles Flown (Millions)	Passengers Carried (Thousands)	Passenger-Miles Flown (Millions)	Passengers Carried (Thousands)
1960	30,557	52,377	8,306	5,499
1961	31,062	52,712	8,769	5,699
1962	33,623	55,950	10,138	6,598
1963	38,457	63,925	11,905	7,513
1964	44,141	72,988	14,352	8,775
1965	51,887	84,460	16,789	10,195
1966	60,591	97,746	19,298	11,646
1967	75,487	118,669	23,259	13,424
1968	87,508	134,423	26,451	15,728
1969	95,946	142,340	29,468	16,848
1970	104,147	153,662	27,563	16,260
1971	106,294	156,098	29,358	17,569
1972	118,138	172,452	34,268	18,897
1973	126,217	183,272	35,640	18,936
1974	129,732	189,733	33,186	17,725
1975	131,728	188,746	31,082	16,316
1976	145,271	206,274	33,717	17,039
1977	156,609	222,283	36,610	18,043
1978	182,669	253,960	44,112	20,759
1979	208,891	292,700	53,132	24,163
1980[r]	200,829	272,829	54,363	24,074
1981	198,632	265,107	50,125	20,613

Source: Civil Aeronautics Board, Information Management Division.

NOTE: Figures represent scheduled passenger services excluding nonrevenue operations of certificated route air carriers.

[r] Revised.

U.S. AIRLINES[a]
TOTAL ASSETS AND INVESTMENT IN EQUIPMENT
Fiscal Years 1960-1981
(Millions of Dollars)

Year	TOTAL Assets[b]	Value of Flight Equipment	Value of Ground Property, Equipment & Other[c]	Less: Depreciation	Equals: Net Value of Owned Property & Equipment	Investment in Owned Property and Equipment as a Percent of Total Assets
1960	$ 1,760	$ 2,174	$ 90	$ 890	$ 1,374	78.1%
1961	2,099	2,719	77	1,062	1,734	82.6
1962	2,273	3,006	52	1,183	1,875	82.4
1963	2,211	3,132	27	1,341	1,818	82.2
1964	2,415	3,383	48	1,402	2,029	84.0
1965	2,816	3,844	52	1,505	2,391	84.9
1966	3,747	4,520	107	1,646	2,981	79.6
1967	5,003	5,485	153	1,805	3,833	76.6
1968	6,294	6,936	204	2,044	5,096	76.6
1969	7,107	8,003	195	2,334	5,864	82.5
1970	7,417	8,546	298	2,814	6,030	81.3
1971	7,664	9,375	203	3,231	6,347	82.8
1972	8,017	9,813	200	3,484	6,529	81.4
1973	13,967	12,377	350	4,495	8,232	58.9
1974	14,979	13,288	194	4,846	8,636	57.7
1975	15,098	13,668	192	5,278	8,582	56.8
1976	15,452	14,398	189	6,376	8,211	53.1
1977	16,868	14,822	187	8,140	6,869	40.7
1978	20,745	16,127	3,367	8,799	10,695	51.6
1979[r]	24,907	18,561	3,985	9,746	12,800	51.4
1980[r]	28,900	20,859	4,682	10,309	15,232	52.7
1981[p]	30,729	22,537	5,167	11,053	16,651	54.2

Source: Civil Aeronautics Board, Information Management Division.

[a] Through 1979, includes certificated domestic trunks, local service, Intra-Alaska, Intra-Hawaii, other carriers, all-cargo, regional carriers, and helicopters. Effective 1980, includes all U.S. certificated route and charter carriers. Commuters and air taxis excluded.

[b] Comprises net investment in buildings and ground equipment, flight equipment, working capital, etc.

[c] Includes construction work in progress.

[r] Revised.

[p] Preliminary.

SOURCES OF OPERATING REVENUE TOTAL DOMESTIC OPERATIONS, ALL U.S. AIRLINES[a]

Calendar Years 1960-1981
(Millions of Dollars)

Year	TOTAL Operating Revenues	Passenger	Mail[b]	Express and Freight	Excess Baggage	Other[c]
1960	$ 2,129	$ 1,860	$ 113	$ 103	$ 21	$ 32
1961	2,245	1,951	130	115	20	29
1962	2,498	2,168	139	136	20	35
1963	2,722	2,375	143	152	17	35
1964	3,095	2,701	149	182	17	46
1965	3,608	3,142	157	220	12	77
1966	4,070	3,534	162	251	6	117
1967	4,887	4,260	170	287	7	163
1968	5,606	4,913	182	343	9	159
1969	6,438	5,662	186	401	10	179
1970	7,131	6,246	205	461	12	207
1971	7,753	6,736	227	527	13	250
1972	8,652	7,565	230	596	13	248
1973	9,694	8,379	263	694	14	344
1974	11,545	9,758	264	759	17	747
1975	12,020	10,123	253	782	19	843
1976	13,901	11,856	294	933	22	796
1977	15,821	13,771	355	1,109	21	565
1978	18,184	15,507	266	1,325	23	1,063
1979	21,652	18,720	387	1,456	28	1,061
1980[r]	26,404	23,317	446	1,582	32	1,026
1981[p]	29,008	25,681	503	1,664	36	1,124

Source: Civil Aeronautics Board, Information Management Division.

NOTE: Detail may not add to totals because of rounding.

[a] Through 1979, includes certificated domestic trunks, local service, Intra-Alaska, Intra-Hawaii, other carriers, all-cargo regional carriers, and helicopters. Effective 1980, includes all U.S. certificated route and charter carriers. Commuters and air taxis excluded.

[b] Includes U.S. as well as foreign mail.

[c] Includes revenues not related to transport. Effective 1980, includes subsidy, which previously was included with mail. In 1981, includes $12 million of transport revenues not specifically broken out by category by some small carriers.

[r] Revised.

[p] Preliminary.

REVENUES AND EXPENSES
TOTAL DOMESTIC OPERATIONS, ALL U.S. AIRLINES[a]

Calendar Years 1960-1981
(Millions of Dollars)

Year	TOTAL Operating Revenues	TOTAL Operating Expenses	Operating Profit
1960	$ 2,129	$ 2,091	$ 38
1961	2,245	2,244	1
1962	2,498	2,408	90
1963	2,722	2,580	142
1964	3,094	2,778	316
1965	3,608	3,165	443
1966	4,070	3,589	481
1967	4,887	4,476	411
1968	5,606	5,298	308
1969	6,438	6,156	282
1970	7,131	7,128	3
1971	7,753	7,496	257
1972	8,652	8,158	493
1973	9,694	9,200	494
1974	11,545	10,760	785
1975	12,020	11,902	117
1976	13,901	13,326	575
1977	15,821	15,164	657
1978	18,184	17,151	1,033
1979	21,652	21,522	130
1980[r]	26,404	26,409	-6
1981[p]	29,008	29,272	-264

Source: Civil Aeronautics Board, Information Management Division.
NOTE: Detail may not add to totals because of rounding.

[a] Through 1979, includes certificated domestic trunks, local service, Intra-Alaska, Intra-Hawaii, other carriers, all cargo, regional carriers, and helicopters. Effective 1980, includes all U.S. certificated route and charter carriers. Commuters and air taxis excluded.

[r] Revised.

[p] Preliminary.

COMPOSITION OF ACTIVE U.S. AIR CARRIER FLEET TYPE OF AIRCRAFT, NUMBER OF ENGINES AND MODEL

Active as of December 1977-1981

	1977^r	1978^r	1979^r	1980	1981
TOTAL	2,473	2,545	3,609	3,805	3,973
Turbojets—TOTAL	2,168	2,237	2,486	2,526	2,511
Four-Engine—TOTAL	544	509	517	441	365
Boeing 707/720	243	215	182	149	68
Boeing 747	108	115	131	144	147
B.Ae. Aerospatiale Concorde	—	—	9	—	—
Convair 880 (22)/990(30)	—	—	6	6	6
Lockheed L-1329	—	1	1	—	—
McDonnell Douglas DC-8	193	178	188	142	144
Three-Engine—TOTAL	1,069	1,146	1,256	1,347	1,363
Boeing 727	865	931	1,029	1,092	1,096
Lockheed L-1011	77	82	87	102	106
McDonnell Douglas DC-10	127	133	140	153	161
Twin-Engine—TOTAL	555	582	713	738	783
Airbus A-300	2	6	12	19	25
Boeing 737	160	173	206	220	236
B.Ae. BAC-111	31	30	28	27	27
Cessna C500 Citation I	—	—	4	—	1
Dassault MD-20, Falcon	—	—	44	42	27
Fokker F-28	—	—	—	5	9
Grumman G-1159	—	—	6	5	3
Hamburger Flugzeugbau HF-320	—	—	4	—	—
Israel Westwind 1123/1124	—	—	2	1	—
Learjet LR-23/LR-24	—	—	8	5	3
Learjet LR-25	—	—	6	7	1
Learjet LR-35	—	—	4	3	—
McDonnell Douglas DC-9	362	373	381	394	447
Rockwell NA-265	—	—	2	2	—
Sud Aviation SE210 Caravelle	—	—	6	5	2
Sud Aviation SN601	—	—	—	3	2
Turboprops—TOTAL	234	240	565	682	852
Four-Engine—TOTAL	60	67	81	92	105
Canadair CL44D	—	—	1	2	4
De Havilland DHC-7	—	—	8	18	29
Lockheed 188 Electra	40	46	52	52	51
Lockheed 382/L-100 Hercules	20	21	20	20	20
Vickers V745	—	—	—	—	1

(Continued on next page)

COMPOSITION OF ACTIVE U.S. AIR CARRIER FLEET
TYPE OF AIRCRAFT, NUMBER OF ENGINES AND MODEL(Continued)

	1977[r]	1978[r]	1979[r]	1980	1981
Twin-Engine—TOTAL	174	173	484	590	747
Beech BE99	—	—	85	87	102
Beech BE90	—	—	3	2	2
Beech BE 200	—	—	4	1	2
Cessna C212	—	—	—	2	15
Cessna C441	—	—	—	1	—
Convair 580/600/640[r]	98	91	120	119	251
DeHavilland DHC-6	14	13	78	107	96
Embraer EMB110	—	—	4	34	66
Fairchild/Fokker F-27/FH-227[r]	26	30	28	15	16
Fairchild Swearingen SA-226	6	8	66	100	72
Fairchild Swearingen SA-227	—	—	—	—	4
GAF N22/N24 Nomad	—	—	1	9	3
Grumman G-73	—	—	—	—	1
Grumman G-159	1	1	15	16	17
Handley Page HP-137	—	—	16	15	12
Hawker-Siddeley HS748	1	1	1	2	2
Israel Aircraft AR101B	—	—	—	—	2
Nihon YS-11	23	19	18	22	27
Nord ND-262/STC-262	5	9	24	22	15
Piper PA31T	—	—	—	—	1
Short SD-3	—	—	—	34	39
Short SC-7	—	—	—	2	2
Short SD-330	—	1	21	—	—
Piston-Engine—TOTAL	68	65	557	595	606
Four-Engine—TOTAL	33	42	58	73	68
DeHavilland DHC-114	—	—	7	27	21
Douglas DC-4	1	2	4	5	6
Douglas DC-6	30	39	46	41	41
Douglas DC-7	1	—	—	—	—
Lockheed 1049	1	1	1	—	—
Twin-Engine—TOTAL	34	21	499	522	535
Single-Engine—TOTAL	1	2	—	—	3
Helicopters—TOTAL	3	3	1	2	4

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Effective 1978, includes certified route air carriers, supplemental air carriers (charters), and all aircraft over 12,500 pounds operated by air taxis, commercial operators and travel clubs. Effective 1979, includes multi-engine aircraft in passenger service of commuters. "Active aircraft" must have a current U.S. registration and have been flown during the calendar year.

ACTIVE U.S. CIVIL AIRCRAFT

as of December 31, 1960-1980

Year	TOTAL[r]	Air Carrier[a]	General Aviation Aircraft					
			TOTAL	Fixed-Wing Aircraft			Rotorcraft[b]	Other[c]
				Multi-Engine	Single-Engine			
					4-place & over	3-place & less		
1960	78,684	2,135	76,549	7,243	34,829	33,472	634	371
1961	82,736	2,104	80,632	8,401	38,206	32,800	798	427
1962	86,168	2,047	84,121	9,186	41,120	32,341	967	507
1963	87,167	2,079	85,088	9,695	42,647	30,977	1,171	588
1964	90,823	2,081	88,742	10,644	45,777	30,367	1,306	648
1965	97,567	2,125	95,442	11,977	49,789	31,364	1,503	809
1966	106,978	2,272	104,706	13,548	52,972	35,687	1,622	877
1967	116,638	2,452	114,186	14,651	56,865	39,675	1,899	1,096
1968	126,823	2,586	124,237	16,760	60,977	42,830	2,350	1,320
1969	133,496	2,690	130,806	18,111	63,703	45,001	2,557	1,434
1970	134,422	2,679	131,743	18,291	64,759	44,884	2,255	1,554
1971	133,790	2,642	131,148	17,855	64,464	44,792	2,352	1,685
1972	147,593	2,583	145,010	19,849	70,998	49,448	2,787	1,928
1973	156,139	2,599	153,540	21,929	74,831	51,386	3,143	2,251
1974	163,974	2,472	161,502	23,418	78,924	53,008	3,610	2,542
1975	170,970	2,495	168,475	24,559	82,621[r]	54,390	4,073	2,832
1976	180,796	2,492	178,304	25,684	88,211	56,730	4,505	3,174
1977	186,767	2,473	184,294	26,652	91,960	57,340	4,726	3,616
1978	201,323	2,545	198,778[d]	28,782	101,466	59,185	5,315	4,028
1979	213,944	3,609	210,335	31,311	106,028	62,362	5,864	4,770
1980	214,850	3,805	211,045	31,664	107,930	60,505	6,001	4,945

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Before 1971, an active aircraft was one certified as eligible to fly. Currently, an "active aircraft" must have a current U.S. registration and have been flown during the previous calendar year.

[a] Effective 1978, includes certificated route air carriers, supplemental air carriers (charters), and all aircraft over 12,500 pounds operated by air taxis, commercial operators and travel clubs. Effective 1979, includes multi-engine aircraft in passenger service of commuters.

[b] Includes autogiros; excludes air carrier helicopters.

[c] Includes gliders, dirigibles and balloons.

[d] Detail does not add to total because of estimating procedures.

[r] Revised.

ACTIVE U.S. CIVIL AIRCRAFT BY PRIMARY USE AND TYPE OF AIRCRAFT

As of December 31, 1980

Primary Use[a]	TOTAL	Fixed Wing			Helicopter	Other
		Turbojet	Turboprop	Piston		
TOTAL—ALL AIRCRAFT	214,850	5,518	4,772	193,609	6,003	4,945
Air Carrier—TOTAL	3,805	2,526	682	595	2	—
Certificated Route Air Carriers	2,505	2,336	163	6	—	—
Supplemental Air Carriers	148	59	73	16	—	—
Commercial Operators	24	8	7	9	—	—
Air Taxis	135	29	37	67	2	—
Commuters	835	9	375	451	—	—
All Cargo	146	76	24	46	—	—
Air Travel Clubs	12	9	3	—	—	—
General Aviation—TOTAL	211,045	2,992	4,090	193,014	6,001	4,945
Executive	14,860	2,350	2,600	8,845	947	116
Business	49,391	110	420	47,717	749	393
Commuter[b]	944	9	256	673	1	1
Air Taxi[b]	7,615	187	501	6,139	785	1
Aerial Application	7,294	—	58	6,548	684	1
Industrial	2,813	23	9	1,824	956	—
Instructional	14,862	52	1	13,934	274	598
Rental	11,829	44	70	11,229	260	224
Personal	96,222	8	10	92,301	592	3,308
Other	5,216	203	161	3,800	749	299

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).
NOTE: Detail may not add to totals because of estimating procedures.

[a] Definitions of "primary use " categories available in Glossary of "FAA Statistical Handbook."

[b] Air taxis under 12,500 pounds and single-engine commuters; other aircraft in these categories included with "air carriers."

U.S. GENERAL AVIATION ACTIVE AIRCRAFT AND HOURS FLOWN BY PRIMARY USE

Calendar Years 1977-1980

Primary Use[a]	1977	1978	1979	1980
ACTIVE AIRCRAFT AS OF DECEMBER 31				
TOTAL	184,294	198,778	210,339	211,045
Executive	8,782	12,666	13,638	14,860
Business	41,396	42,809	49,658	49,391
Commuter[b]	6,838	7,936	8,399	944
Air Taxi[b]				7,615
Aerial Application	7,392	7,418	7,494	7,294
Industrial	1,342	2,059	3,259	2,813
Instructional	16,096	14,742	15,456	14,862
Rental	8,619	8,189	12,771	11,829
Personal	88,292	96,209	94,427	96,222
Other	4,799	6,749	5,236	5,216
THOUSANDS OF HOURS FLOWN				
TOTAL	35,792	39,290	43,340	41,016
Executive	3,487	4,882	5,001	5,332
Business	6,822	8,014	8,979	8,434
Commuter[b]	4,130	4,424	4,573	961
Air Taxi[b]				3,535
Aerial Application	2,058	2,066	2,372	2,044
Industrial	453	702	1,120	1,053
Instructional	6,529	5,009	6,462	5,748
Rental	2,793	3,284	4,206	3,917
Personal	8,453	9,601	9,471	8,894
Other	879	1,308	1,052	1,008

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Detail may not add to totals because of rounding and estimating procedures.

[a] Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."

[b] Air taxis under 12,500 pounds and single-engine commuters; other aircraft in these categories classified as "air carriers."

ACTIVE U.S. AIRMAN CERTIFICATES HELD

As of December 31, 1977-1981

	1977	1978	1979	1980	1981
Pilots—TOTAL	783,932	798,833	814,667	827,071	764,182
Students	203,510	204,874	210,180	199,833	179,912
Private	327,424	337,644	343,276	357,479	328,562
Commercial	188,763	185,833	182,097	183,442	168,580
Airline Transport	50,149	55,881	63,652	69,569	70,311
Helicopter (only)	4,819	4,874	5,218	6,030	6,453
Glider (only)[a]	6,208	6,541	6,796	7,039	7,388
Other Pilot[a]	3,059	3,186	3,448	3,679	2,976
Non-Pilots—TOTAL	348,584	362,350	377,213	393,486	398,368
Mechanics[b]	220,768	228,743	237,611	250,157	262,705
Parachute Rigger[b]	8,994	9,200	9,381	9,547	9,716
Ground Instructor[b]	55,717	57,738	59,680	61,550	63,246
Dispatcher[b]	5,972	6,161	6,446	6,799	7,094
Control Tower Operator	25,107	25,388	25,232	25,130	15,528
Flight Navigator	2,155	2,092	1,994	1,936	1,785
Flight Engineer	29,871	33,028	36,869	38,367	38,294
Flight Instructor Certificates[c]	49,362	52,201	54,398	60,440	57,523
Instrument Ratings[c]	226,334	236,312	247,096	260,461	252,535

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

[a] Glider and lighter-than-air pilots are not required to have a medical examination; however, the totals above are the pilots who received a medical.

[b] No periodic medical examination required; therefore, no determination as to current activity can be made.

[c] Special ratings shown on pilot certificates represented above, not additional certificates.

U.S. CIVIL AND JOINT-USE AIRCRAFT FACILITIES[a] BY TYPE AND STATE

As of December 31, 1981

State	TOTAL	Public	Paved	Lighted	State	TOTAL	Public	Paved	Lighted
TOTAL	15,476[a]	4,798	6,012	4,796					
U.S.—TOTAL	15,422	4,768	5,971	4,778					
Alabama	165	97	122	96	Nebraska	334	94	90	93
Alaska	689	477	57	104	Nevada	128	62	51	26
Arizona	224	96	108	72	New Hampshire	52	15	29	19
Arkansas	157	81	89	76	New Jersey	271	35	104	62
California	832	295	547	275	New Mexico	156	66	70	48
Colorado	312	90	134	93	New York	486	83	191	140
Connecticut	105	15	58	28	N. Carolina	286	90	116	107
Delaware	37	3	12	15	N. Dakota	365	97	65	87
Dist. of Col.	16	7	13	5	Ohio	674	133	230	197
Florida	506	132	203	151	Oklahoma	297	126	153	128
Georgia	293	125	149	122	Oregon	318	96	122	84
Hawaii	51	18	36	12	Pennsylvania	698	77	220	156
Idaho	196	126	58	43	Rhode Island	18	8	10	7
Illinois	929	98	175	174	S. Carolina	137	66	65	65
Indiana	365	78	112	123	S. Dakota	162	74	47	71
Iowa	270	117	113	155	Tennessee	164	77	100	81
Kansas	376	129	115	140	Texas	1,431	322	650	400
Kentucky	125	62	79	58	Utah	102	57	62	42
Louisiana	292	74	137	77	Vermont	65	20	16	9
Maine	158	45	41	31	Virginia	260	58	105	84
Maryland	145	24	62	48	Washington	363	118	165	126
Massachusetts	136	35	83	44	W. Virginia	90	28	50	33
Michigan	417	133	154	166	Wisconsin	408	102	122	129
Minnesota	493	145	107	141	Wyoming	105	44	46	32
Mississippi	180	82	93	78					
					Puerto Rico	33	13	28	11
Missouri	393	118	155	143	Virgin Islands	6	4	2	2
Montana	190	118	80	82	S. Pacific[b]	15	13	11	5

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).

[a] 15,476 aircraft facilities = 12,427 airports, 2,507 heliports, 57 stolports, and 485 seaplane bases. Facilities having joint civil-military use are included.

[b] American Samoa, Guam, and Trust Territories.

Helicopter Transportation

In 1981, the number of heliports in the United States, Canada and Puerto Rico reached 3,985, an all-time high that reflects continuing growth of rotary wing services. Of the total, 3,666 are ground level heliports and 319 are rooftop facilities. These statistics are contained in the 1981 *Directory of Heliports in the United States, Canada and Puerto Rico,* compiled by Aerospace Industries Association and jointly published by AIA and *Aviation Week & Space Technology* magazine. The directory estimates that there are approximately 1,000 additional heliports on offshore oil rigs in American waters.

The number of land-based heliports represented an increase of more than 16 percent over the 3,134 facilities reported in 1977, the last prior year the directory was published. The greatest increase was in hospital heliports; the 1981 directory listed 905 such facilities, a 29 percent increase over the 699 in use in 1977.

The Pacific region of the United States led in heliport availability with 734; close behind were the Middle Atlantic (727) and East North Central (718) regions. The directory reported 107 heliports in Canada and 71 in Puerto Rico.

In 1980, the latest year for which figures are available, there were 2,573 civil operators flying 8,575 helicopters in the U.S., Canada and Puerto Rico. A breakdown of helicopters in operation showed 5,581—65 percent of the total—in commercial service, 1,635 being used as corporate/executive aircraft and 1,360 in service with civil government agencies.

After a two-year hiatus, scheduled U.S. helicopter operations resumed as three operators inaugurated services during the year; they boarded more than 56,000 passengers and flew a combined 1,183,000 ton-miles. New York Helicopter, operating between New York area airports and a downtown Manhattan heliport, carried the bulk of the traffic; the airline began scheduled operations in January 1981 and flew some 50,000 passengers. Executive Airlines, Inc., Houston, Texas, started service in August and boarded 5,280 passengers during the remainder of the year. SFO Helicopter Airlines, headquartered at Oakland (California) International Airport, initiated service in mid-November and flew about 1,000 passengers.

Two new American-built civil helicopter types were introduced to operational services in 1981. In the spring, Boeing Vertol started deliveries of its Model 234 tandem-rotor 44-passenger civil transport and the first customer—British Airways Helicopters—inaugurated service in July. Early in the year, Bell Helicopter Textron made first deliveries of its Model 412 transport and by year-end 50 of the aircraft were operational, the majority of them in the petroleum support service. Production continued on the Sikorsky S-76 transport and at the end of 1981 the S-76 fleet numbered 166 aircraft operating in 26 countries. Back in production after a hiatus of several years was Hiller Aviation's redesigned FH-1100; the first model was delivered late in the year.

In rotorcraft research, flight testing continued on two prototypes of the Bell/NASA/Army XV-15 Tilt Rotor Research Aircraft, which has both military and civil potential. After a lengthy series of tests by NASA, the No. 1 XV-15 was returned to the Bell plant for modification and further company testing; NASA's Ames Research Center continued to explore the XV-15's performance envelope with the No. 2 aircraft. NASA was also conducting flight tests of two Sikorsky/NASA/Army Rotor Systems Research Aircraft, flying laboratories for evaluation of new rotor, propulsion and other helicopter systems.

CIVIL HELICOPTER OPERATORS AND HELICOPTERS OPERATED IN THE UNITED STATES, CANADA AND PUERTO RICO

Selected Years 1965-1980

Year	TOTAL	Commercial	Corporate and Executive	Civil Government Agencies[a]
CIVIL HELICOPTER OPERATORS				
1965	860	508	299	53
1966	933	519	353	61
1967	1,023	522	427	74
1969	1,379	689	596	94
1971	1,424	672	590	162
1972	1,491	758	566	167
1973	1,532	752	599	181
1974	1,536	725	608	203
1975	1,891	779	833	279
1976	2,330	911	1,082	337
1977	2,547	959	1,219	369
1978	3,003	1,126	1,515	362
1980[c]	2,573	1,065	1,160	348
HELICOPTERS OPERATED[b]				
1965	2,053	1,537	401	115
1966	2,318	1,699	475	144
1967	2,438	1,764	487	187
1969	3,433	2,390	770	273
1971	3,874	2,605	802	467
1972	4,185	2,992	745	448
1973	4,601	3,295	780	526
1974	4,819	3,418	778	623
1975	5,222	3,342	1,056	824
1976	6,181	3,702	1,392	1,087
1977	7,160	4,294	1,578	1,288
1978	8,023	4,904	1,891	1,228
1980[c]	8,575	5,581	1,635	1,360

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States, Canada and Puerto Rico, 1980."

[a] Federal, state and local governments.

[b] Includes helicopters on order.

[c] Latest available data. Because computerization of Directory data resulted in the elimination of some duplication of operator and helicopter listings, 1980 data are not comparable with those of previous years.

HELIPORTS AND HELISTOPS IN THE UNITED STATES, CANADA AND PUERTO RICO

By Region
Selected Years 1972-1981

Region	**1972**	**1973**	**1975**	**1977**	**1981**
TOTAL	2,326	2,384	3,268	3,433	3,985
Elevated Facilities	211	241	277	299	319
New England	87	78	143	164	168
Middle Atlantic	571	581	684	795	727
East North Central	281	307	411	397	718
West North Central	109	110	98	107	164
South Atlantic	190	204	352	306	416
East South Central	65	64	107	144	203
West South Central	216	217	338	339	409
Mountain	168	176	241	213	268
Pacific	545	551	789	821	734
Puerto Rico	24	24	30	73	71
Canada	70	72	75	74	107

Source: Aerospace Industries Association, "Directory of Heliports in the U.S., Canada, Puerto Rico, 1981."
NOTE: Totals include proposed fracilities.

HOSPITAL HELIPORTS IN THE UNITED STATES, CANADA AND PUERTO RICO

By Region
Selected Years 1972-1981

Region	**1972**	**1973**	**1975**	**1977**	**1981**
TOTAL	354	384	565	699	905
New England	5	5	16	21	31
Middle Atlantic	43	42	55	73	93
East North Central	82	99	126	150	193
West North Central	22	21	22	29	69
South Atlantic	39	50	76	82	135
East South Central	18	18	29	54	171
West South Central	26	26	59	67	77
Mountain	29	32	56	67	88
Pacific	87	87	119	147	135
Puerto Rico	–	–	–	2	2
Canada	3	4	7	7	11

Source: Aerospace Industries Association, "Directory of Heliports in the U.S., Canada, Puerto Rico, 1981."
NOTE: Totals include proposed fracilities.

SPECIFICATIONS OF U.S. CIVIL HELICOPTERS IN OPERATION/PRODUCTION

As of April 1982

COMPANY	Commercial Model	Number of Places	Useful Load (Lbs.)	Range with Useful Load N. Miles	External Cargo Payload (Lbs.)
Bell Helicopter Textron Fort Worth, TX	47G Series	3	670-1210	212-238	0-1000
	47J Series	4	1090-1204	224-258	—
	AG-5	2	1300	102	—
	204 Series	7-11	1956-4880	123-335	—
	205A-1	15	4542	276	5000
	206 Series	4-5	1315-1630	240-304	1200-1500
	206L Series	7	1894-1931	297-308	2000
	212	15	5238	226	5000
	214 Series	16	5450-8035	219-435	6000-8000
	222	7-10	2985	356	2500
	412	15	5333	232	5000
Boeing Vertol Company Philadelphia, PA	107-II	28	7585	240	11,500
	234 Chinook (LR)	47	23,300	620	28,000
	234 Chinook (UT)	3	30,000	264	28,000
Brantley-Hynes Helicopter, Inc. Frederick, OK	B2B	2	670	225	400
	305	5	1200	275	800
The Enstrom Helicopter Corp. Menominee, MI	F-28 Series	3	700-1000	238-272	500-1000
	280 Series	3-4	700-1038	263-270	500-1000
Hiller Aviation Porterville, CA	12-E Series	3-4	1264-1341	215	1000
	12-ET Series	3-4	1450	351	1000
	FH-1100	5	1355	396	1500
Hughes Helicopters, Inc. Culver City, CA	300 Series	3	698-1004	191-224	1104
	500 Series	4-7	1320-1660	276-287	1560-2000
Robinson Helicopter Co. Torrance, CA	R22	2	486	208	—
United Technologies Corp. Sikorsky Aircraft Div. Stratford, CT	S-58T	14-16	5370	271	5000
	S-58JT	14-16	4923	282	5000
	S-62A	13	2967	453	3000
	S-61L(MARK II) Airline	30	7208	305	6500
	S-61 (MARK II) Payloader	2	11,600	305	11,000
	S-61N(MARK II)	26-28	7990	490	6000
	S-76(MARK II)	14	4525	466	4200

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States, Canada and Puerto Rico, 1980/81."

CIVIL HELICOPTER FLEET
UNITED STATES, CANADA AND PUERTO RICO
1980[a]

State	OPERATORS				HELICOPTERS			
	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.
Alabama	51	11	29	11	346	19	40	287
Alaska	52	34	14	4	290	261	24	5
Arizona	62	32	24	6	204	135	43	26
Arkansas	16	6	7	3	28	9	14	5
California	271	122	103	46	927	544	175	208
Colorado	52	24	19	9	135	83	29	23
Connecticut	17	7	10	–	29	14	15	–
Delaware	7	–	6	1	8	–	6	2
Dist. of Col.	9	2	–	7	29	2	–	27
Florida	153	61	55	37	489	315	81	93
Georgia	23	7	8	8	66	28	7	31
Hawaii	19	13	5	1	37	28	7	2
Idaho	38	18	14	6	87	58	18	11
Illinois	48	23	15	10	114	72	20	22
Indiana	53	19	22	12	97	41	28	28
Iowa	24	12	8	4	40	22	8	10
Kansas	20	8	8	4	37	16	10	11
Kentucky	56	10	43	3	91	34	49	8
Louisiana	56	22	22	12	692	593	76	23
Maine	8	4	3	1	18	10	4	4
Maryland	16	7	6	3	52	30	6	16
Massachusetts	22	9	11	2	50	32	15	3
Michigan	56	17	28	11	103	43	33	27
Minnesota	30	15	14	1	73	50	19	4
Mississippi	10	2	2	6	20	4	2	14
Missouri	31	15	9	7	74	42	9	23
Montana	24	15	4	5	63	46	4	13
Nebraska	19	8	9	2	35	19	14	2
Nevada	23	10	8	5	56	34	13	9
New Hampshire	12	6	6	–	25	15	10	–
New Jersey	66	23	37	6	145	84	46	15
New Mexico	19	7	10	2	36	18	13	5

(Continued on next page)

CIVIL HELICOPTER FLEET
UNITED STATES, CANADA AND PUERTO RICO (Continued)

1980[a]

State	OPERATORS				HELICOPTERS			
	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.
New York	91	29	48	14	245	133	68	44
North Carolina	27	6	16	5	48	15	18	15
North Dakota	14	10	4	–	30	26	4	–
Ohio	85	30	48	7	153	77	56	20
Oklahoma	33	13	16	4	115	78	18	19
Oregon	87	40	42	5	406	320	52	34
Pennsylvania	114	34	79	1	202	101	93	8
Rhode Island	4	2	1	1	6	3	2	1
South Carolina	26	7	14	5	59	38	15	6
South Dakota	7	3	1	3	8	4	1	3
Tennessee	49	14	25	10	101	38	25	38
Texas	195	71	107	17	564	340	170	54
Utah	25	17	7	1	144	132	11	1
Vermont	6	–	6	–	6	–	6	–
Virginia	39	12	20	7	56	17	22	17
Washington	89	46	35	8	200	128	42	30
West Virginia	54	10	40	4	74	19	46	9
Wisconsin	21	6	12	3	68	52	11	5
Wyoming	14	8	6	–	34	28	6	–
Puerto Rico	5	1	2	2	9	1	2	6
Not Stated	3	2	–	1	4	3	–	1
TOTAL—U.S.	2,351	930	1,088	333	7,028	4,254	1,506	1,268
Canada	222	135	72	15	1,547	1,327	129	91
GRAND TOTAL	2,573	1,065	1,160	348	8,575	5,581	1,635	1,359

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States, Canada and Puerto Rico, 1980/81."

[a] Latest available data.

HELICOPTER TRAFFIC
U.S. AIRLINES

Calendar Years 1960-1981[a]
(Thousands)

Year	Miles Flown	Passengers Carried	Passenger-Miles	Ton-Miles[b]
1960	2,219	430	9,475	1,054
1961	2,157	490	8,604	963
1962	1,518	359	8,192	897
1963	1,462	458	12,510	1,317
1964	1,976	608	16,003	1,668
1965	1,984	718	18,811	1,948
1966	2,241	1,067	25,420	2,562
1967	2,660	1,220	29,670	2,960
1968	2,547	1,042	24,856	2,482
1969	1,909	737	17,074	1,703
1970	1,427	573	11,341	1,167
1971	1,048	551	8,973	917
1972	1,022	587	10,009	1,020
1973	1,085	613	10,936	1,108
1974	1,029	592	10,298	1,055
1975	873	505	8,370	868
1976	709	444	7,490	755
1977	468	268	4,625	466
1978	403	282	4,927	495
1979	58	36	625	63
1980	—	—	—	—
1981	—	—	—	—

Source: Civil Aeronautics Board, Information Management Division.

[a] No scheduled helicopter operations by certificated route air carriers from April 1979 through 1981. During 1981, however, one certificated carrier offered non-scheduled service, and three non-certificated carriers began operating scheduled helicopter service, carrying a total of more than 56,000 passengers.

[b] Passengers, mail, express, and freight.

REVENUE TON-MILE TRAFFIC CARRIED HELICOPTER SERVICES BY U.S. AIRLINES

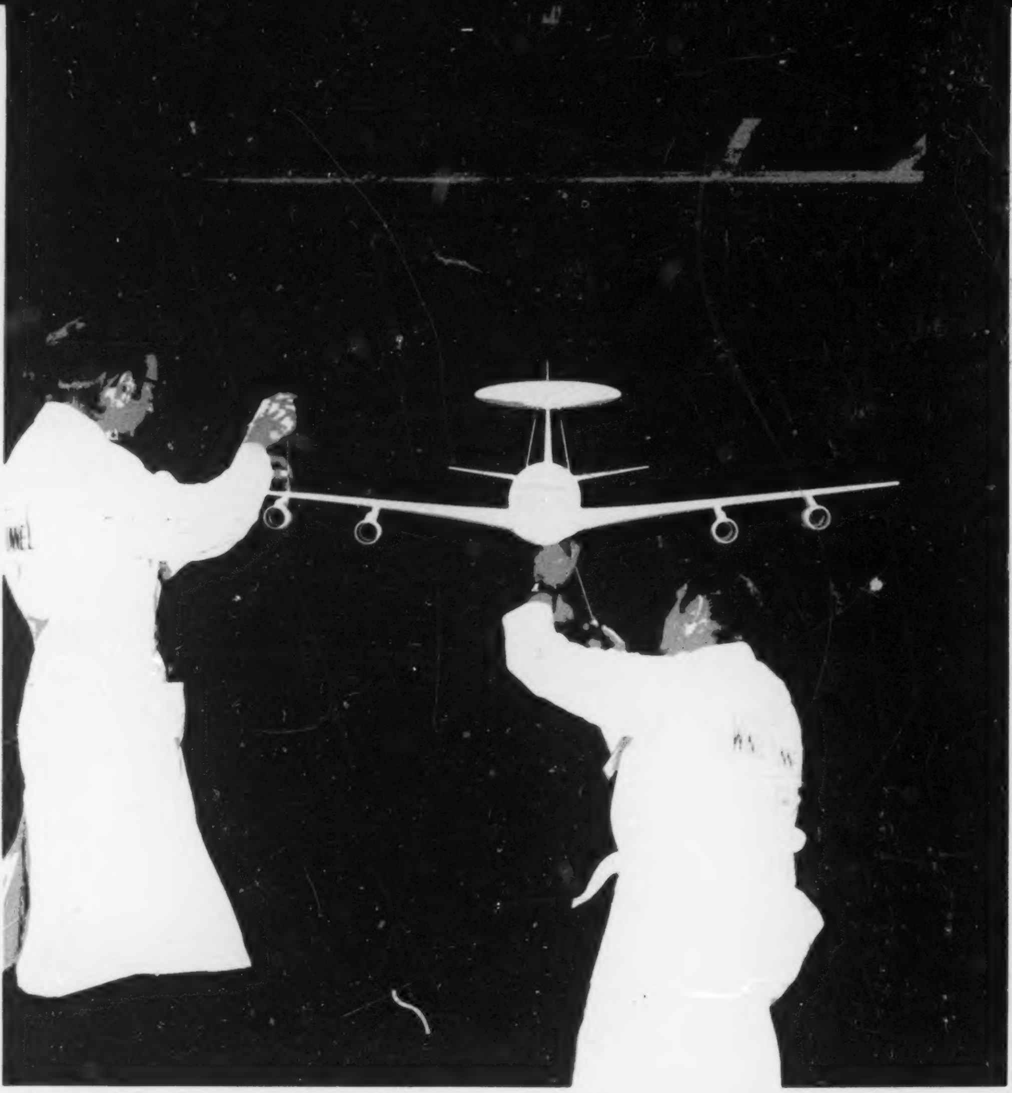
Calendar Years 1960-1981[a]
(Thousands)

Year	TOTAL Ton-miles	Passenger	U.S. Mail	Express	Freight
1960	1,054	916	91	40	7
1961	963	822	94	40	7
1962	897	780	65	44	6
1963	1,317	1,193	74	44	6
1964	1,668	1,525	92	45	6
1965	1,948	1,794	84	60	10
1966	2,562	2,422	60	70	10
1967	2,960	2,826	61	64	9
1968	2,482	2,367	57	48	8
1969	1,704	1,627	34	37	6
1970	1,167	1,133	5	25	4
1971	917	897	4	13	3
1972	1,020	1,000	5	12	3
1973	1,108	1,094	3	8	3
1974	1,055	1,047	4	2	2
1975	868	860	5	1	2
1976	755	749	3	—	2
1977	465	462	2	—	1
1978	495	493	1	—	1
1979	63	63	—	—	—
1980	—	—	—	—	—
1981	—	—	—	—	—

Source: Civil Aeronautics Board, Information Management Division.

[a] No scheduled helicopter operations by certificated route air carriers from April 1979 through 1981. During 1981, however, one certificated carrier offered non-scheduled service, and three non-certificated carriers began operating scheduled helicopter service, carrying a total of more than 56,000 passengers.

Research and Development



Expenditures for aerospace research and development, including both federal and industry funding, increased only slightly in 1981 and in real terms—adjusted for inflation—declined by some 6.5 percent. The decline was contrary to the national all-industries experience, in which real expenditures increased by more than 3.5 percent.

In current dollars, aerospace R&D funding amounted to $9.8 billion, up approximately $200 million over 1980. Federal funding increased from $6.9 billion in 1980 to $7.9 billion in 1981; the latter figure represented 80 percent of the combined government/industry funding. Aerospace companies provided $2 billion for R&D, compared with $2.7 billion in the previous year.

Estimates for 1982 indicate that aerospace R&D will rebound and that the aerospace industry will regain its top ranking; in 1980 and 1981, aerospace was in second place behind the electrical machinery/communications equipment industry. A forecast by Battelle Institute projects 1982 aerospace

R&D expenditures of $12.2 billion, which would represent an increase of almost 25 percent compared with a projected all-industries average increase of 12.3 percent. The Battelle forecast estimates an increase in company aerospace R&D funding of $1.2 billion (to $3.2 billion) and almost a $1.2 billion increase in federal funding (to $9 billion). Aerospace would rank first in total expenditures among U.S. industries, with outlays more than $1 billion higher than the second place electrical machinery/communications equipment industry.

National Science Foundation data show that funding for aerospace industry R&D, measured as a percentage of net sales, is substantially higher than the average for all manufacturing industries. In 1980, the latest year for which figures are available, total aerospace R&D funding (federal and company money) amounted to 11.6 percent of the industry's net sales; the national all-industry average was 3.1 percent. R&D funding provided by aerospace companies was 3.3 percent of net sales, compared with the national average of 2.2 percent. For the decade of the seventies, aerospace company R&D funding averaged 3.2 percent of net sales annually, while company funding in all manufacturing industries averaged 2.1 percent.

Overall federal outlays for research and development increased in Fiscal Year 1981 by $3.9 billion to $34.2 billion. Estimates for FY 1982 show a total of $37.4 billion, up more than nine percent over FY 1981. The Administrations's budget plan contemplates R&D outlays of $41.1 billion in FY 1983; that would represent a 10 percent increase over the FY 1982 estimate.

In R&D areas primarily affecting the aerospace industry, Department of Defense outlays for FY 1982 are estimated at $18.8 billion, an increase of almost 20 percent over the previous year. For FY 1983, a further 20 percent increase is projected, bringing defense R&D outlays to $22.7 billion.

NASA R&D funding was expected to increase some $400 million, but the gain approximates the anticipated inflation rate so FY 1982 is essentially a zero growth year. However, the budget plan contemplates a major boost in NASA outlays for FY 1983—almost $800 million, or about 13 percent.

Reflecting the Administration's policy of reduced federal R&D sponsorship for those energy technologies sufficiently advanced to warrant industry investment, energy R&D funding by the government is projected to drop slightly in FY 1982 and sharply in FY 1983. The budget plan shows a decline of $173 million (3.3 percent) to a FY 1982 level of $4.9 billion; in FY 1983, there will be a further drop of $844 million (17 percent) to $4.1 billion.

In FY 1982, federal outlays for aeronautical R&D are projected to increase by $258 million, about eight percent or slightly below the inflation rate. Defense funding for aeronautics is expected to increase by $278 million to $2.8 billion; NASA funding will decline $21 million to $501 million; and Department of Transportation funding will remain approximately level at $107 million.

FUNDS FOR RESEARCH AND DEVELOPMENT
ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1968-1982
(Millions of Dollars)

Year	All Industries[a]			Aerospace Industry[b]		
	Total	Federal Funds	Company Funds[c]	Total	Federal Funds	Company Funds[c]
CURRENT DOLLARS						
1968	$17,429	$ 8,560	$ 8,869	$ 5,765	$4,533	$1,230
1969	18,308	8,451	9,857	5,882	4,524[r]	1,354
1970	18,067	7,779	10,288	5,219	4,005	1,213
1971	18,320	7,666	10,654	4,881	3,864	1,017
1972	19,552	8,017	11,535	4,950	3,970	978
1973	21,249	8,145	13,104	5,052	3,899	1,154
1974	22,887	8,220	14,667	5,278	4,000	1,278
1975	24,187	8,605	15,582	5,713	4,428	1,285
1976	26,997	9,561	17,436	6,339	4,921	1,418
1977	29,928	10,521	19,407	7,104	5,541	1,563
1978	33,365	11,209	22,156	7,690	5,811	1,879
1979[r]	38,147	12,492	25,655	8,290	5,997	2,293
1980[r]	43,879	13,939	29,940	9,626	6,896	2,730
1981[E]	49,600	15,750	33,850	9,814	7,860	1,954
1982[E]	55,700	17,800	37,900	12,244	9,055	3,187
CONSTANT DOLLARS (1972 = 100)						
1968	$21,116	$10,371	$10,745	$6,984	$5,492	$1,490
1969	21,095	9,737	11,357	6,778	5,213	1,560
1970	19,756	8,506	11,250	5,707	4,379	1,326
1971	19,081	7,985	11,097	5,084	4,025	1,059
1972	19,552	8,017	11,535	4,950	3,970	978
1973	20,105	7,707	12,399	4,780	3,689	1,092
1974	19,916	7,153	12,763	4,593	3,481	1,112
1975	19,263	6,851	12,410	4,550	3,527	1,023
1976	20,435	7,237	13,198	4,798	3,725	1,073
1977	21,403	7,524	13,879	5,080	3,963	1,118
1978	22,236	7,470	14,766	5,125	3,873	1,252
1979	23,436	7,675	15,762	5,093	3,684	1,409
1980	24,740	7,859	16,881	5,427	3,888	1,539
1981[E]	25,605	8,131	17,474	5,066	4,057	1,009
1982[E]	26,663	8,521	18,143	5,861	4,335	1,526

Source: National Science Foundation, for historical data and All Industries estimates; Battelle Memorial Institute, "Probable Levels of R&D Expenditures....Forecast and Analysis," (Annually) for Aerospace Industry estimates; "Economic Report of the President," (Annually) and "The Budget of the United States Government," (Annually) for GNP deflator series used to calculate constant dollar values.

NOTE: Detail may not add to totals because of rounding.

[a] Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.

[b] Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

[c] Company funds include all funds for industrial R&D work performed within company facilities except funds provided by the Federal Government. Excluded are company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

[r] Revised.

[E] Estimate.

FUNDS FOR RESEARCH AND DEVELOPMENT IN AEROSPACE

By Type of Research and Fund Source
Calendar Years 1960-1980
(Millions of Dollars)

YEAR	TOTAL AERO-SPACE	Applied Research and Development Funds			Basic Research Funds		
		TOTAL	Federal Govern-ment Contracts	Company	TOTAL	Federal Govern-ment Contracts	Company
1960	$3,514	$3,452	$3,118	$ 334	$62	$32	$30
1961	3,829	3,789	3.417	372	40	20	20
1962	4,042	3,987	3,558	429	55	30	25
1963	4,712	4,653	4,229	424	59	31	28
1964	5,078	5,010	4,585	424	68	35	33
1965	5,148	5,074	4,457	617	74	42	32
1966	5,526	5,452	4,685	767	74	39	35
1967	5,669	5,596	4,497	1,099	73	34	39
1968	5,765	5,694	4,508	1,185	70	25	45
1969	5,882	5,816	4,500	1,313	65	23	42
1970	5,219	5,156	3,985	1,170	63	20	43
1971	4,881	4,831	3,848	983	50	16	34
1972	4,950	4,887	3,949	937	62	21	41
1973	5,052	4,992	3,871	1,118	58	20	38
1974	5,278	5,221	3,895	1,236	57	18	39
1975	5,713	5,659	4,416	1,243	54	18	36
1976	6,339	6,285	4,899^E	1,386^E	54	22^E	32^E
1977	7,104	7,048	5,516^E	1,532^E	56	25^E	31^E
1978	7,690	NA	NA	NA	NA	NA	NA
1979	8,290	8,202^E	5,993^E	2,209^E	88^E	45^E	43^E
1980[a]	9,626	NA	NA	NA	NA	NA	NA

Source: National Science Foundation.
NOTE: Totals may not add because of rounding.
a Latest year available.
r Revised.
NA Not available; details on sources and application of funds available only for odd-numbered years.

RESEARCH AND DEVELOPMENT FUNDS AS PERCENT OF NET SALES ALL MANUFACTURING INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1967-1980

Year	All Manufacturing Industries[a]		Aerospace Industries[b]	
	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales
1967	4.2%	2.1%	19.7%	4.0%
1968	4.0	2.1	19.0	4.1
1969	4.0	2.2	20.2	4.6
1970	3.7	2.2	16.2	3.8
1971	3.5	2.1	16.2	3.4
1972	3.4	2.0	16.6	3.3
1973	3.3	2.0	13.3	3.0
1974	3.1	2.0	14.1	3.5
1975	3.1	2.0	12.7	2.8
1976	3.1	2.0	12.7	2.8
1977	3.1	2.0	12.8	2.8
1978	3.2	2.1	12.2	3.0
1979	3.0	2.1	11.4	3.2
1980	3.1	2.2	11.6	3.3

Source: National Science Foundation.

[a] Includes all manufacturing industries known to conduct or finance research and development.

[b] Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles and parts.

FUNDS FOR ENERGY RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1977-1981
(Millions of Dollars)

	1977	1978	1979	1980	1981[E]
All Industries[a] — TOTAL	$2,599	$3,026	$3,795	$4,366	$4,753
Federal Funds	951	1,193	1,497	1,669	NA
Company Funds	1,648	1,833	2,298	2,697	NA
Aerospace Industry[b] — TOTAL	$ 165	$ 283	$ 372	$ 441	$ 394
Federal Funds	108	215	259	295	NA
Company Funds	57	68	113	146	NA

Source: National Science Foundation.

[a] Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.

[b] Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles and parts.

NA Not available.

E Estimated by surveyed companies.

EXPENDITURES FOR POLLUTION ABATEMENT RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1976-1980
(Millions of Dollars)

	1976	1977	1978	1979	1980
All Industries,[a].	$ 754	$ 901	$1,054	$1,237	$1,183
Aerospace Industry[b].	48	57	64	64	38

Source: National Science Foundation.

[a] Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.

[b] Companies classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles and parts.

FEDERAL AERONAUTICS RESEARCH AND DEVELOPMENT

Budget Authority
Fiscal Years 1967-1982
(Millions of Dollars)

Year	TOTAL	NASA[a]	DOD[b]	DOT[c]
1967	$1,613	$105	$1,199	$309
1968	1,404	136	1,126	142
1969	1,300	169	1,161	—30[d]
1970	1,882	199	1,641	42
1971	1,990	210	1,707	73
1972	2,295	236	1,964	95
1973	2,187	313	1,799	75
1974	2,030	278	1,678	74
1975	2,015	314	1,627	74
1976	2,351	325	1,941	85
Tr. Qtr.	584	83	480	22
1977	2,727	378	2,256	93
1978	3,338	437	2,807	94
1979	2,850	519	2,240	91
1980	2,991	560	2,336	95
1981[E]	3,161	522	2,533	106
1982[E]	3,419	501	2,811	107

Source: NASA, "Aeronautics and Space Report of the President" (Annually).

NOTE: Latest available data, based on proposed FY 1982 Federal budget.

[a] Research and Development, Construction of Facilities, Research and Program Management.

[b] Research, Development, Testing and Evaluation of aircraft and related equipment.

[c] Federal Aviation Administration Research, Engineering and Development and Facilities, Engineering and Development.

[d] Unobligated balances for SST research and development, rescinded in 1969.

[E] Estimate.

FEDERAL OUTLAYS FOR CONDUCT OF RESEARCH AND DEVELOPMENT

Fiscal Years 1960-1983
(Millions of Dollars)

Year	TOTAL	DOD	NASA	Energy[a]	Other
1960	$ 7,738	$ 5,654	$ 401	$ 986	$ 697
1961	9,278	6,618	744	1,111	805
1962	10,379	6,812	1,257	1,284	1,026
1963	12,000	6,849	2,552	1,335	1,264
1964	14,694	7,517	4,171	1,505	1,501
1965	14,875	6,728	5,093	1,520	1,534
1966	16,002	6,735	5,933	1,462	1,872
1967	16,842	7,680	5,426	1,467	2,269
1968	16,865	8,148	4,724	1,593	2,400
1969	16,207	7,858	4,251	1,654	2,444
1970	15,632	7,568	3,753	1,616	2,695
1971	15,050	7,541	3,382	1,303	2,824
1972	16,629	8,275	3,422	1,552	3,380
1973	17,407	8,574	3,315	1,623	3,895
1974	18,239	8,956	3,256	1,825	4,202
1975	19,525	9,341	3,266	2,277	4,641
1976	20,233	9,329	3,521	2,225	5,158
1977	22,462	10,176	3,763	3,181	5,342
1978	24,532	10,726	3,833	3,925	6,048
1979	26,578	11,454	4,064	4,413	6,648
1980	30,351	13,451	4,711	4,698	7,492
1981	34,252	15,720	5,279	5,121	8,132
1982[E]	37,425	18,784	5,696	4,948	7,997
1983[E]	41,122	22,673	6,460	4,104	7,885

Source: "The Budget of the United States Government," (Annually).
NOTE: Totals may not add because of rounding.
[a] Energy research and development programs transferred from AEC to ERDA with 1974 reorganization, to Dept. of Energy in 1977, and is proposed to be funded through the Energy Research and Technology Administration of the Dept. of Commerce as of 1983.
[E] Estimate.

DEPARTMENT OF DEFENSE
APPROPRIATIONS FOR
RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1981-1983
(Millions of Dollars)

	1981	1982^E	1983^E
TOTAL—APPROPRIATIONS FOR RDT&E	$16,633	$20,044	$24,257
BY APPROPRIATION			
Army	3,124	3,610	4,484
Navy	5,025	5,807	6,232
Air Force	7,133	8,876	11,221
Defense Agencies	1,309	1,698	2,260
Director of Test Evaluation	42	53	60
BY RESEARCH CATEGORIES			
Research	615	695	828
Exploratory Development	1,985	2,213	2,509
Advanced Development	2,806	3,476	4,689
Engineering Development	6,394	7,683	8,919
Management and Support	1,736	2,009	2,224
Operational Systems Development	3,097	3,968	5,088
RECAP OF BUDGET ACTIVITIES			
Technology Base	2,600	2,907	3,337
Advanced Technology Development	593	736	952
Strategic Programs	3,440	4,643	6,647
Tactical Programs	6,130	6,900	7,576
Intelligence and Communications	1,632	2,202	2,772
Defensewide Mission Support	2,238	2,656	2,973
RECAP OF FYDP PROGRAMS			
Strategic Forces	682	713	854
General Purpose Forces	713	848	1,250
Intelligence and Communications	1,661	2,362	2,953
Airlift/Sealift	27	31	13
Research and Development (FYDP Program 6)	13,537	16,075	19,169
Central Supply and Maintenance	10	11	14
Training, Medical and Other	1	1	1
Support of Other Nations	2	3	3

Source: Department of Defense Budget (Annually).
E Estimate.

DEPARTMENT OF DEFENSE
OUTLAYS FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1970-1983
(Millions of Dollars)

By Function

Year	TOTAL, All RDT&E Functions	Aircraft	Missiles	Astronautics	Other
1970	$ 7,166	$ 1,239	$ 2,196	$ 753	$ 2,978
1971	7,303	1,699	2,008	519	3,077
1972	7,881	2,066	2,157	468	3,190
1973	8,157	2,036	2,038	512	3,571
1974	8,582	1,893	2,160	561	3,968
1975	8,866	1,698	2,176	515	4,477
1976	8,923	1,603	2,295	581	4,444
Tr. Qtr.	2,206	410	520	129	1,147
1977[a]	9,795	2,176	2,259	537	4,823

By Agency

Year	TOTAL, All RDT&E Functions	Air Force	Navy	Army	Other
1970	$ 7,166	$ 2,937	$ 2,084	$ 1,665	$ 480
1971	7,303	2,809	2,405	1,569	520
1972	7,881	3,205	2,427	1,779	470
1973	8,157	3,362	2,404	1,912	479
1974	8,582	3,240	2,623	2,190	529
1975	8,866	3,308	3,021	1,964	573
1976	8,923	3,338	3,215	1,842	528
Tr. Qtr.	2,203	830	778	437	161
1977	9,795	3,618	3,481	2,069	627
1978	10,508	3,626	3,825	2,342	715
1979	11,152	4,080	3,826	2,409	837
1980	13,127	5,017	4,382	2,707	1,021
1981	15,278	6,341	4,783	2,958	1,196
1982[E]	18,299	7,969	5,412	3,366	1,552
1983[E]	22,200	10,197	5,947	4,039	2,017

Source: Department of Defense Budget (Annually).
a Data no longer available in this format.
E Estimate

DEPARTMENT OF DEFENSE PRIME CONTRACT AWARDS[a] FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1977-1981
(Millions of Dollars)

Program Categories	1977	1978	1979	1980	1981
TOTAL—RDT&E	$7,893	$8,683	$8,543	$9,470	$10,483
Research	319	323	381	648	694
Exploratory Development	673	780	726	868	1,081
Other Development	6,247	6,895	6,327	6,920	8,233
Management & Support	654	685	1,109	1,034	474
Aircraft—TOTAL	$1,649	$1,640	$1,315	$1,171	$ 739
Research	3	2	9	3	4
Exploratory Development	31	43	25	39	57
Other Development	1,606	1,591	1,268	1,126	672
Management & Support	9	4	13	3	6
Missile and Space Systems—TOTAL	2,302	2,721	3,064	3,363	4,603
Research	16	20	13	36	27
Exploratory Development	133	178	137	173	277
Other Development	2,023	2,415	2,530	2,800	4,184
Management & Support	130	108	384	354	115
Electronics & Communications Equipment—TOTAL	1,789	1,765	1,893	2,417	2,582
Research	35	37	56	67	74
Exploratory Development	165	156	226	260	305
Other Development	1,500	1,476	1,499	1,977	2,110
Management & Support	89	96	112	113	93
All Other—TOTAL[b]	2,153	2,557	2,271	2,519	2,558
Research	265	264	304	542	589
Exploratory Development	344	403	338	396	441
Other Development	1,118	1,413	1,029	1,017	1,268
Management & Support	426	477	600	564	260

Source: Department of Defense, "Prime Contract Awards by Service Category and Federal Supply Classification" (Annually).

NOTE: Detail may not add to totals because of rounding.

[a] Effective FY 1980, data include DOD contract awards for civil functions; data for prior years limited to military prime contract awards.

[b] "All Other" includes ships, tank-automotive weapons, ammunition and services.

MILITARY AIRCRAFT PROGRAMS
RESEARCH, DEVELOPMENT, TEST AND EVALUATION[a]

By Agency, Type and Model
Fiscal Years 1981, 1982 and 1983
(Millions of Dollars)

Agency, Type and Model	1981	1982[E]	1983[E]
AIR FORCE			
A-10 A/E Thunderbolt II	$ 34.8	$ 13.9	$ 6.5
B-1B	219.1	471.0	753.5
B-52G Cruise Missile Carrier Aircraft Modification	9.0	15.0	37.6
B-52G/H Avionics Modernization	45.0	21.9	4.5
C-5 Wing Modification	11.0	15.6	6.9
C-141 Modification	7.0	—	—
E-3A (AWACS)	62.1	52.4	78.9
*Engine Model Derivative Program (EMDP)	73.7	38.5	10.3
European Distrib. System Aircraft (EDSA)	—	—	1.3
EF-111A Modification	5.5	9.2	27.3
F-15 Eagle	11.0	32.3	125.3
F-16 Multimission Fighter	42.4	57.3	86.1
KC-135 Re-Engining/Modernization	16.2	24.9	26.4
LANTIRN (Night Precision Attack)	57.2	90.4	108.3
Precision Location Strike System (PLSS)	62.8	87.8	98.9
NAVY			
A-6E Intruder	$ —	$ —	$ 4.7
AV-8B	236.4	226.4	114.1
CH-53E Super Stallion	8.3	10.9	11.2
E-2C Hawkeye	16.8	18.9	52.3
EA-6B Prowler	9.0	10.6	12.7
F-14A Tomcat	35.9	21.2	21.7
F/A-18 Hornet	170.9	190.0	109.2
P-3C Orion	29.6	18.6	21.6
SH-2F Seasprite (LAMPS MK-I)	—	8.1	10.1
SH-60B Seahawk LAMPS	100.2	72.6	9.0
ARMY			
AH-1S Cobra/Tow	$ 2.5	$ 19.6	$ 12.2
UH-60A Black Hawk	—	6.2	6.7
CH-47 Modernization	0.6	—	—
AH-64 Attack Helicopter	172.9	91.9	33.7

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).

[a] Total Obligational Authority.

[E] Estimate.

* Programs in R&D only.

MISSILE PROGRAMS
RESEARCH, DEVELOPMENT, TEST AND EVALUATION[a]

By Agency, Type and Model
Fiscal Years 1981, 1982 and 1983
(Millions of Dollars)

Agency, Type and Model	1981	1982[E]	1983[E]
AIR FORCE			
ALCM	$ 108.9	$103.7	$186.8
* AMRAAM[b]	45.4	144.4	212.4
* ASMS	96.5	99.6	50.1
GLCM	107.6	80.1	28.6
IR Maverick	39.3	14.6	5.4
Minuteman II/III	53.1	19.6	13.0
M-X	1,491.6	1,963.2	2,759.3
Target Drones[b]	59.7	71.1	57.7
NAVY			
Harm[b]	$ 77.8	$ 19.8	$ 6.7
Harpoon	—	—	1.9
* MRASM (Tomahawk II)	9.0	19.0	19.9
Phoenix	35.4	30.4	23.8
Sidewinder[b]	2.1	—	—
Sparrow	3.1	5.0	—
Standard ER (SM2)	29.1	24.5	26.9
Standard MR(SM-1)	15.8	15.0	10.3
Standard MR(SM-2)	23.7	24.2	15.9
Tomahawk	133.9	141.7	96.9
Trident I	26.0	41.5	36.2
* Trident II	96.7	239.2	366.7
ARMY			
Copperhead	$ 6.0	$ 3.3	$ 2.1
Laser Hellfire	44.5	24.2	19.3
MLRS	69.9	38.2	23.2
Patriot	75.4	57.8	47.1
Pershing II	149.4	150.6	111.3
Roland	12.6	—	—
Stinger[c]	5.7	16.1	—
TOW[c]	22.7	6.6	2.0

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).

E Estimate.

a Total Obligational Authority.

b Includes Navy and Air Force.

c Includes Army and Marine Corps.

* Programs in R&D only.

Foreign Trade

TDA
PSA
PSA
swissair
HAWAIIAN AIR
TDA 東亜

In 1981, the United States experienced an international trade deficit of more than $30 billion, the sixth consecutive year of U.S. deficits and the second largest during that span. There was, however, a bright spot in the otherwise gloomy U.S. trade picture: another solid performance by the aerospace industry, the nation's most export-productive manufacturing sector. Reaching new peak levels of export sales and trade balance, aerospace softened the adverse impact of deficits incurred in other areas of U.S. international trade and once again demonstrated the vital importance to the U.S. economy of high-value, high-technology aerospace exports.

Aerospace exports totaled $17.6 billion, $2.1 billion more than in 1980, which was the previous record year. The 1981 aerospace trade balance, best among the U.S. manufacturing industries, was $13.1 billion, up from $12 billion in 1980. This exceptional trade performance was more impressive for the fact that it was achieved in a year when foreign aerospace competition, on the rise for several years, reached peak intensity.

A signpost of concern for the aerospace industry and the U.S. economy was the unprecedented level of sales to U.S. customers by foreign manufacturers, particularly in certain civil aircraft, engines and parts categories. U.S. imports of aerospace products totaled a record $4.5 billion, up almost $1 billion from the previous year.

Aircraft imports, almost entirely civil-use planes, amounted to $1.4 billion, up from $975 million in the preceding year. Imports of aircraft engines and parts totaled $1.5 billion, virtually all of it in civil turbine engines and parts; the figure compares with $1.1 billion in 1980.

Among aircraft imports, the key figure was $913 million for general aviation aircraft, defined herein as all civil-use fixed wing planes under 33,000 pounds. This figure represented an increase over 1980 of $417 million and marked the first time that U.S. imports of general aviation aircraft exceeded exports ($790 million). It reflects the increasing penetration of the U.S. market for certain commuter-type airliners, business jets and other high-value multi-engine airplanes in the 10,000-33,000 pounds category; imports in that category alone totaled $788 million. Imports of larger transport aircraft (over 33,000 pounds) declined from $286 million in 1980 to $196 million in 1981, but helicopter imports almost doubled, increasing from $54 million in 1980 to $105 million in 1981.

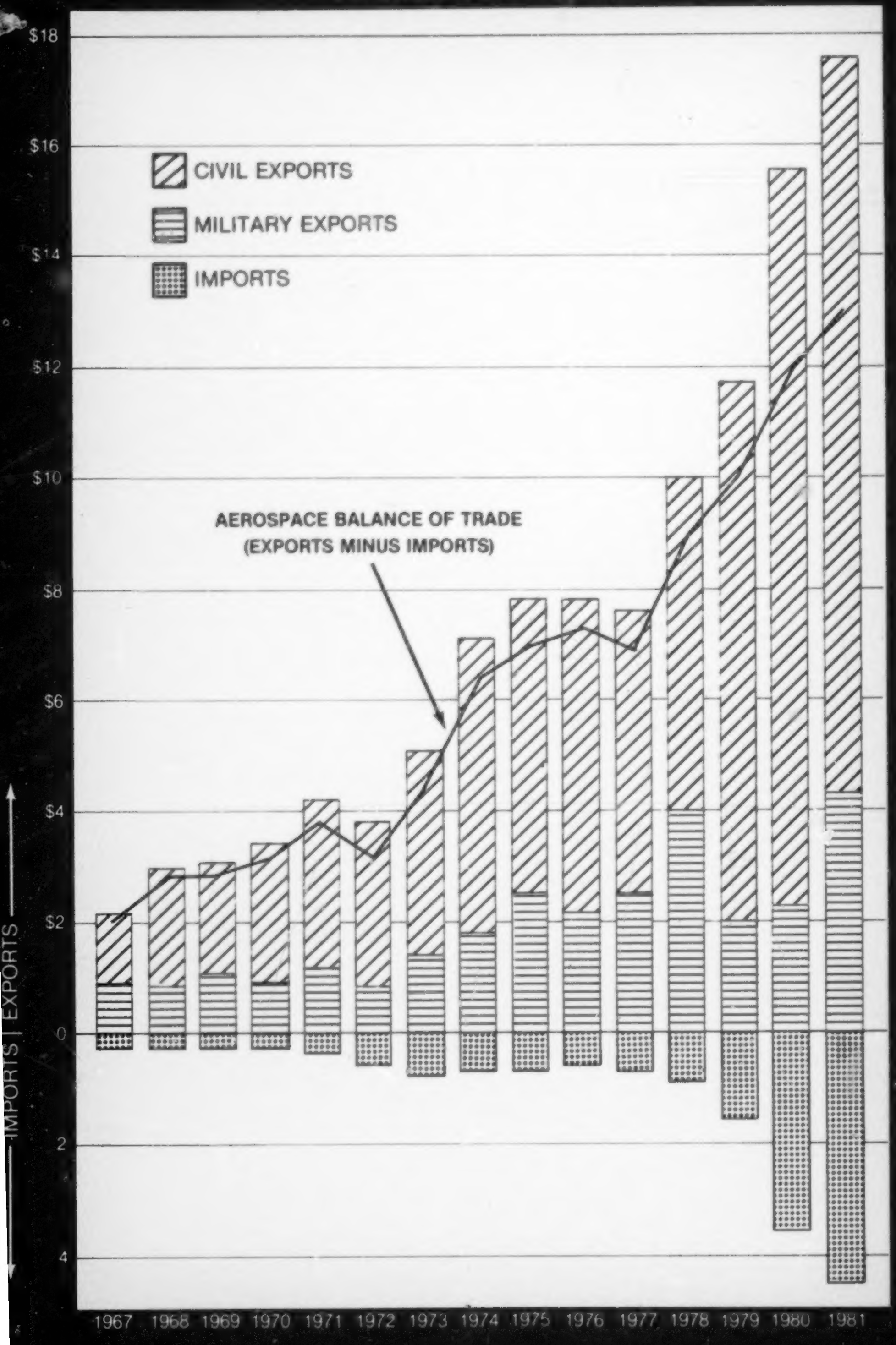
Within the $17.6 billion of U.S. aerospace exports, sales of civil products predominated, accounting for $13.3 billion or more than 75 percent of the total. Civil exports, however, barely topped the 1980 value of $13.2 billion. The major growth in 1981 was in military exports which, at $4.3 billion, were up $2 billion over the previous year.

As in previous years, sales of commercial transport aircraft represented the greatest dollar value among aerospace exports. However, the rate of increase was far below that of previous years; only 6.7 percent in 1981, compared with 35 percent in 1980 and 95 percent in 1979. For 1981, export sales of transports totaled $7.2 billion, up from $6.7 billion in 1980. Shipments of general aviation aircraft to foreign buyers declined in numbers for the second straight year (2,617 units, down 561) but increased in dollar value ($790 million, up $50 million). Similarly, helicopter shipments abroad declined (to 453 units, down 72) but dollar value gained ($346 million, up $48 million).

The large growth in military exports was in complete aircraft (up from $949 million in 1980 to $1.7 billion in 1981) and in aircraft and engine parts (almost $2 billion, compared with $497 million in 1980). Exports of guided missiles and rockets dropped to $556 million from $749 million in the previous year.

AEROSPACE EXPORTS, IMPORTS, AND TRADE BALANCE

(Billions of Current Dollars)



Source: Bureau of the Census

TOTAL AND AEROSPACE BALANCE OF TRADE

Calendar Years 1960-1981
(Millions of Dollars)

Year	TOTAL U.S. Trade Balance[a]	Aerospace			Aerospace Trade Balance as Percent of U.S. Total
		Trade Balance	Exports	Imports	
1960	$ 5,369	$ 1,665	$ 1,726	$ 61	31.0%
1961	6,096	1,501	1,653	152	24.6
1962	4,180	1,795	1,923	128	42.9
1963	6,061	1,532	1,627	95	25.3
1964	7,555	1,518	1,608	90	20.1
1965	5,875	1,459	1,618	159	24.8
1966	4,524	1,370	1,673	303	30.3
1967	4,409	1,961	2,248	287	44.5
1968	1,133	2,661	2,994	333	234.9
1969	1,599	2,831	3,138	307	177.0
1970	2,834	3,097	3,405	308	109.3
1971	– 2,024[b]	3,830	4,203	373	*c*
1972	– 6,351	3,230	3,795	565	*c*
1973	1,222	4,360	5,142	782	356.8
1974	– 2,996	6,350	7,095	745	*c*
1975	9,630	7,045	7,792	747	73.2
1976	– 7,786	7,267	7,843	576	*c*
1977	– 28,970	6,850	7,581	731	*c*
1978	– 31,786	9,058	10,001	943	*c*
1979	– 27,260	10,123	11,747	1,624	*c*
1980	– 27,340[r]	11,952	15,506	3,554	*c*
1981	– 30,051	13,134	17,634	4,500	*c*

Source: Bureau of the Census, "Highlights of U.S. Export and Import Trade," Report FT990 (Monthly); "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually); "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

[a] U.S. Balance of Trade is the difference between exports of domestic merchandise, including Department of Defense shipments, and imports for consumption (customs value base).

[b] First negative U.S. Balance of Trade since 1888.

[c] Not applicable.

[r] Revised.

U.S. IMPORTS OF AEROSPACE PRODUCTS

Calendar Years 1977-1981
(Millions of Dollars)

	1977	1978	1979	1980	1981
TOTAL	$731.2	$943.1	$ 1,624.3	$ 3,553.6	$ 4,500.4
TOTAL AIRCRAFT	310.2	291.8	512.1	975.1	1,379.7
Civil Aircraft - TOTAL	258.0	284.5	508.6	969.1	1,336.2
Transports	100.1	58.1	199.8	285.5	195.5
General Aviation[a]	108.5	146.8	260.4	495.8	913.0
Helicopters	18.1	28.0	21.6	53.9	105.4
Other, Including Used	31.3	51.6	26.8	133.9	122.3
Military Aircraft	50.2	4.9	1.5	4.0	41.4
Gliders	1.8	2.1	1.6	1.5	1.6
Civil	NA	NA	NA	1.5	1.6
Military	NA	NA	NA	—	(*b*)
Balloons & Airships	0.2	0.3	0.4	0.5	0.5
Civil	NA	NA	NA	0.3	0.3
Military	NA	NA	NA	0.2	0.2
TOTAL AIRCRAFT ENGINES & PARTS	131.4	283.0	547.0	1,097.4	1,465.0
Piston, Civil	1.7	1.6	4.0	11.0	5.1
Pist. Engs. & Parts, Mil.				1.1	0.1
Piston Engine Parts, Civil				8.3	7.2
Turbine, Civil	129.7	281.4	324.2	720.3	1,040.6
Turbine, Military				27.5	7.6
Turbine Engine Parts, Civil	NA	NA	218.8	295.1	354.4
Turbine Engine Parts, Military	NA	NA		34.1	50.0
TOTAL OTHER	289.6	368.3	565.2	1,481.1	1,655.7
Aircraft Parts, Civil	NA	NA	NA	198.5	229.6
Spacecraft & Other Parts, Civil	289.1	368.2	564.5	679.1	714.2
Aircraft Parts, Military				121.4	426.8
Other Parts, Military				136.8	64.8
Aircraft, Engs., & Parts Previously Exported from U.S.	NA	NA	NA	345.2	220.0
Other	0.5	0.1	0.7	0.1	0.3

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

Note: Import classifications have been revised as of 1980 data, with the total number of categories increased, and most former categories divided into military and civil items. Also effective, 1980, import data include two new commodity groupings: civil aircraft parts, and aerospace products previously exported from the U.S. Excluded from aerospace trade data as of 1980 are 'Kites and Parts Thereof'; for comparability of annual data, this category has been deducted from totals for previous years.

[a] All fixed-wing aircraft under 33,000 pounds.

[b] Less than $50,000

NA Not available.

U.S. IMPORTS OF COMPLETE AIRCRAFT

Calendar Years 1977-1981

	1977	1978	1979	1980	1981
TOTAL NUMBER OF AIRCRAFT	638	571	634	676	882
Civil Aircraft	303	362	393	580	733
Helicopters	55	74	91	177	213
Single-Engine	74	6	3	6	9
Multi-Engine Under 4400 lbs		47	5	6	2
Multi-Engine 4400-10,000 lbs		87	86	119	123
Multi-Engine 10,000-33,000 lbs	48	50	102	156	218
Multi-Engine Over 33,000 lbs	15	5	9	16	8
Used or Rebuilt	111	93	97	100	160
Military Aircraft	60	61	121	23	25
Gliders	275	148	120	73	124
Balloons & Airships	NA	NA	NA	NA	NA
TOTAL VALUE (Millions of Dollars)	$310.2	$291.8	$512.1	$975.1	$1,379.7
Civil Aircraft	258.0	284.5	508.6	969.1	1,336.2
Helicopters	18.1	28.0	21.6	53.9	105.4
Single-Engine	27.8	0.5	(*a*)	0.3	0.8
Multi-Engine Under 4400 lbs		2.8	0.4	1.2	0.1
Multi-Engine 4400-10,000 lbs		42.1	37.2	95.2	123.7
Multi-Engine 10,000-33,000 lbs	80.7	101.4	222.8	399.1	788.4
Multi-Engine Over 33,000 lbs	100.1	58.1	199.8	285.5	195.5
Used or Rebuilt	31.3	51.6	26.8	133.9	122.3
Military Aircraft	50.2	4.9	1.5	4.0	41.4
Gliders	1.8	2.1	1.6	1.5	1.6
Balloons & Airships	0.2	0.3	0.4	0.5	0.5

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

(*a*) Less than $50,000.

NA Not Available.

EXPORTS OF U.S. AEROSPACE PRODUCTS

Calendar Years 1977-1981
(Millions of Dollars)

	1977	1978	1979	1980	1981
TOTAL	$7,581	$10,001	$11,747	$15,506	$17,634
TOTAL CIVIL	5,049	6,018	9,772	13,248[r]	13,312
Complete Aircraft—TOTAL	2,747	3,625	6,177	8,256	8,613
Transports	1,936	2,558	4,998	6,727	7,180
General Aviation[a]	389	496	650	739	790
Helicopters	105	156	207	299	346
Other, Including Used	317	415	322	491	297
Aircraft Engines—TOTAL	233	277	375	556	784
Jet & Gas Turbines	196	231	323	514	739
Piston	37	46	52	42	45
Aircraft & Eng. Parts Incl. Spares—TOTAL	2,069	2,116	3,220	4,436[r]	3,915
Aircraft Parts & Accessories	1,586	1,472	2,412	3,296[r]	2,960
Aircraft Engine Parts	483	644	808	1,140[r]	955
TOTAL MILITARY	2,532	3,983	1,975	2,258[r]	4,322
Complete Aircraft—TOTAL[b]	1,186	2,243	838	949	1,712
Fighters & Fighter Bombers	686	1,707	494	449	1,006
Transports	317	232	162	231	158
Helicopters	84	82	61	88	177
Other, Including Used	99	222	121	181	371
Aircraft Engines—TOTAL	71	61	67	63	83
Jet & Gas Turbines	64	59	61	58	78
Piston	7	2	6	5	5
Aircraft & Eng. Parts Incl. Spares—TOTAL	826	1,044	467	497[r]	1,971
Aircraft Parts & Accessories	685	912	326	369[r]	1,475
Aircraft Engine Parts	141	132	141	128[r]	496
Guided Missiles, Rockets, & Parts—TOTAL	449	635	603	749	556
Guided Missiles & Rockets	168	335	292	327	213
Missile & Rocket Parts	270	273	279	393	313
Missile & Rocket Engines	5	3	7	13	4
Missile & Rocket Engine Parts	6	24	25	16	26

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

[a] All fixed-wing aircraft under 33,000 pounds.

[b] Includes aircraft exported under Military Assistance Programs and Foreign Military Sales

[r] Revised.

EXPORT—IMPORT BANK
GROSS AUTHORIZATIONS OF CREDITS AND GUARANTEES

Fiscal Years 1970-1981
(Millions of Dollars)

Year	TOTAL Credits[a]	Credits in Support of Commercial Aircraft Exports			
		TOTAL[c]	Percent of TOTAL Credits	Commercial Jet Aircraft	Other[d]
1970	$ 2,209	$ 636.2	28.8%	$ 598.2	$38.0
1971	2,362	490.4	20.8	484.2	6.2
1972	3,285	479.6	14.6	475.4	4.2
1973	4,053	722.4	17.8	689.7	32.7
1974	4,905	946.2	19.3	894.6	51.6
1975	3,812	732.3	19.3	691.2	41.1
1976	2,285	421.9	18.4	398.4	23.5
Tr. Qtr.	282	98.3	34.7	93.8	4.5
1977	747	139.0	18.6	137.6	1.4
1978	2,927	195.2	6.7	189.5	5.7
1979	3,825	1,428.7	37.4	1,399.4	29.3
1980	4,087	1,710.7	41.8	1,692.6	17.5
1981	5,079	2,553.1	50.3	2,550.3	2.8

Year	TOTAL Guarantees[b]	Guarantees in Support of Commercial Aircraft Exports			
		TOTAL[c]	Percent of TOTAL Guarantees	Commercial Jet Aircraft	Other[d]
1970	$ 612	$ 100.2	16.4%	$ 79.2	$21.0
1971	1,420	397.3	28.0	363.6	33.7
1972	1,743	202.7	11.6	175.9	26.8
1973	1,988	243.3	12.2	189.6	53.7
1974	1,594	157.7	9.9	133.0	24.7
1975	1,574	96.7	6.1	64.0	32.7
1976	1,661	107.2	6.4	87.2	20.0
Tr. Qtr.	272	62.6	23.2	58.7	3.9
1977	1,021	319.6	31.3	294.0	25.6
1978	589	97.6	16.6	77.2	20.4
1979	908	261.9	28.8	239.3	22.6
1980	2,510	1,131.9	45.1	1,088.1	43.8
1981	1,506	553.9	36.8	533.4	20.5

Source: Export-Import Bank of the United States.

[a] "Credit" is a loan commitment for direct financing by the Export-Import Bank.

[b] "Guarantee" by the Export-Import Bank of principal and interest on a loan made by another institution such as a commercial bank.

[c] Effective 1981, includes engines as well as complete aircraft.

[d] Includes business aircraft, general aviation aircraft, and related goods and services.

EXPORTS OF CIVIL AIRCRAFT
Calendar Years 1977-1981

	1977	1978	1979	1980	1981
TOTAL NUMBER OF AIRCRAFT	4,368	4,399	5,115	4,434	3,826
Helicopters, Under 2200 lbs.	233	243	294	335	268
Helicopters, Over 2200 lbs.	88	125	165	190	185
Single-Engine Aircraft	2,664	2,640	2,821	2,172	1,800
Multi-Engine Aircraft, Under 4400 lbs.	273	455	645	546	371
Multi-Engine Aircraft, 4400-10,000 lbs.	525	339	360	432	426
Multi-Engine Aircraft, 10,000-33,000 lbs.	7	37	52	28	20
Passenger Aircraft, Over 33,000 lbs.	101	99	172	215	236
Cargo Aircraft, Over 33,000 lbs.		3	13	8	7
Other Aircraft, Over 33,000 lbs.		9	15	14	12
Other Aircraft, Including Balloons, Gliders & Kites	NA	NA	NA	NA	NA
Used or Rebuilt Aircraft	477	449	578	494	501
TOTAL VALUE (Millions of Dollars)	$2,747	$3,625	$6,177	$8,256	$8,613
Helicopters, Under 2200 lbs.	38	42	61	82	71
Helicopters, Over 2200 lbs.	68	114	146	217	275
Single-Engine Aircraft	93	103	124	114	105
Multi-Engine Aircraft, Under 4400 lbs.	27	62	94	88	72
Multi-Engine Aircraft, 4400-10,000 lbs.	262	240	306	454	526
Multi-Engine Aircraft, 10,000-33,000 lbs.	6	91	126	83	87
Passenger Aircraft, Over 33,000 lbs.	1,936	2,111	4,128	5,511	6,087
Cargo Aircraft, Over 33,000 lbs.		142	322	480	363
Other Aircraft, Over 33,000 lbs.		305	548	736	730
Other Aircraft, Including Balloons, Gliders & Kites	4	27	11	5	62
Used or Rebuilt Aircraft	313	388	311	486	235

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).
NA Not available.

EXPORTS OF MILITARY AIRCRAFT

Calendar Years 1977-1981

	1977	1978	1979	1980	1981
TOTAL NUMBER OF AIRCRAFT[a]	721	589	332	462	508
Fighters & Fighter Bombers	244	286	133	90	113
Transports	53	25	17	23	22
Helicopters.	95	108	65	89	68
New Aircraft, NEC	288	110	91	220	156
Used or Rebuilt Aircraft.	41	60	26	40	149
Airships, Balloons, Gliders, etc. .	—	NA	NA	NA	NA
TOTAL VALUE (Millions of Dollars)[a]	$1,186	$2,243	$ 838	$949	$ 1,712
Fighters & Fighter Bombers	686	1,707	494	449	1,006
Transports	317	232	162	231	158
Helicopters.	84	82	61	88	177
New Aircraft, NEC	20	187	96	148	306
Used or Rebuilt Aircraft.	79	11	5	2	15
Airships, Balloons, Gliders, etc. .	—	24	20	31	50

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).
NEC Not elsewhere classified.
NA Not available.
a Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.

EXPORTS OF AIRCRAFT ENGINES

Calendar Years 1979-1981
(Millions of Dollars)

	1979		1980		1981	
	Number	Value	Number	Value	Number	Value
TOTAL	5,421	$ 442	4,970	$ 616	5,014	$ 867
Turbine Engines-New	862	265	1,012	384	1,259	580
Civil	579	211	840	333	1,085	515
Military	283	54	172	51	174	65
Turbine Engines-Used	463	119	635	188	722	237
Civil	417	112	553	181	644	224
Military	46	7	82	7	78	13
Piston Engines	4,096	58	3,323	47	3,033	50
Civil, New, Under 550 HP	2,141	17	1,677	17	1,302	14
Civil, New, Over 500 HP	205	19	171	8	171	10
Civil, Used	1,575	16	1,365	17	1,308	21
Military	175	6	110	5	252	5

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

IMPORTS OF TURBINE AIRCRAFT ENGINES

Calendar Years 1979-1981
(Millions of Dollars)

	1979		1980		1981	
	Number	Value	Number	Value	Number	Value
Turbine Engines	5,067	$ 324	2,645	$ 748	3,404	$1,049
Civil	NA	NA	2,549	720	3,326	1,041
Military	NA	NA	96	28	78	8

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

NA Not available.

EXPORTS OF CIVIL HELICOPTERS

Calendar Years 1977-1981

Region of Destination	1977	1978	1979	1980	1981
TOTAL NUMBER EXPORTED . .	321	368	459	525	453
Canada & Greenland	66	57	85	91	78
Latin America & Caribbean . .	80	78	89	143	140
Europe	63	86	103	118	71
Middle East	13	10	11	21	21
Asia	43	99	80	57	70
Oceania	43	31	66	72	32
Africa	13	7	25	23	41
TOTAL VALUE (Millions of Dollars)	$105.5	$155.7	$ 206.8	$ 298.7	$ 346.4
Canada & Greenland	15.9	17.1	29.4	42.9	40.6
Latin America & Caribbean . .	26.9	29.7	42.4	78.4	89.5
Europe	34.3	50.5	51.6	79.4	91.8
Middle East	4.5	6.2	11.4	24.9	27.2
Asia	15.7	44.4	45.6	51.3	65.3
Oceania	5.8	5.4	21.1	16.3	19.5
Africa	2.4	2.4	5.3	5.5	12.5

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

IMPORTS OF CIVIL HELICOPTERS

Calendar Years 1977-1981

Country of Origin	1977	1978	1979	1980	1981
TOTAL NUMBER IMPORTED	55	74	90	177	213
France	42	66	81	167	193
Germany	11	–	5	9	12
Italy	2	7	4	1	8
Other Country	–	1	–	–	–
TOTAL VALUE (Millions of Dollars)	$ 18.1	$ 28.0	$ 21.6	$ 53.9	$ 105.4
France	13.0	22.8	17.3	48.4	92.4
Germany	4.0	–	1.3	4.4	6.9
Italy	1.1	4.9	3.0	1.1	6.1
Other Country	–	0.3	–	–	–

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

NA Not available.

EXPORTS OF GENERAL AVIATION AIRCRAFT[a]

Calendar Years 1977-1981

Region of Destination	1977	1978	1979	1980	1981
TOTAL NUMBER EXPORTED	3,469	3,471	3,878	3,178	2,617
Canada & Greenland	702	461	478	414	336
Latin America & Caribbean	1,336	1,195	1,557	1,452	1,220
Europe	592	882	988	760	442
Middle East	17	17	38	19	23
Asia	70	84	120	55	57
Oceania	561	666	537	253	301
Africa	179	166	160	225	238
Country Not Stated	12	-	-	-	-
TOTAL VALUE (Millions of Dollars)	$ 388.4	$ 495.6	$ 650.5	$ 739.5	$ 789.5
Canada & Greenland	39.4	41.2	55.7	49.9	57.7
Latin America & Caribbean	135.6	155.0	221.1	239.5	279.6
Europe	115.3	178.2	219.3	235.0	219.7
Middle East	26.0	14.0	27.4	65.1	30.2
Asia	8.6	12.7	31.5	36.9	39.1
Oceania	31.1	53.0	60.7	52.6	75.8
Africa	32.2	41.5	34.8	60.5	87.4
Country Not Stated	0.2	-	-	-	-

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

[a] All fixed-wing aircraft under 33,000 pounds.

IMPORTS OF GENERAL AVIATION AIRCRAFT

Calendar Years 1977-1981

Country of Origin	1977	1978	1979	1980	1981
TOTAL NUMBER IMPORTED	122	190	196	287	352
Brazil	-	-	5	20	37
Canada	7	6	11	38	51
France	40	78	35	48	59
Israel	14	14	26	33	42
Japan	28	62	69	56	70
United Kingdom	25	24	40	62	67
Other	8	6	10	30	26
TOTAL VALUE (Millions of Dollars)	$108.5	$146.8	$ 260.4	$ 495.8	$ 913.0
Brazil	-	-	5.3	21.7	54.0
Canada	5.5	10.7	20.5	88.2	243.0
France	45.2	50.6	75.3	141.8	248.2
Israel	25.6	27.4	55.6	79.2	123.8
Japan	8.6	14.6	19.9	21.7	34.3
United Kingdom	23.0	40.6	74.2	107.1	183.7
Other	0.6	2.9	9.6	36.1	26.0

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

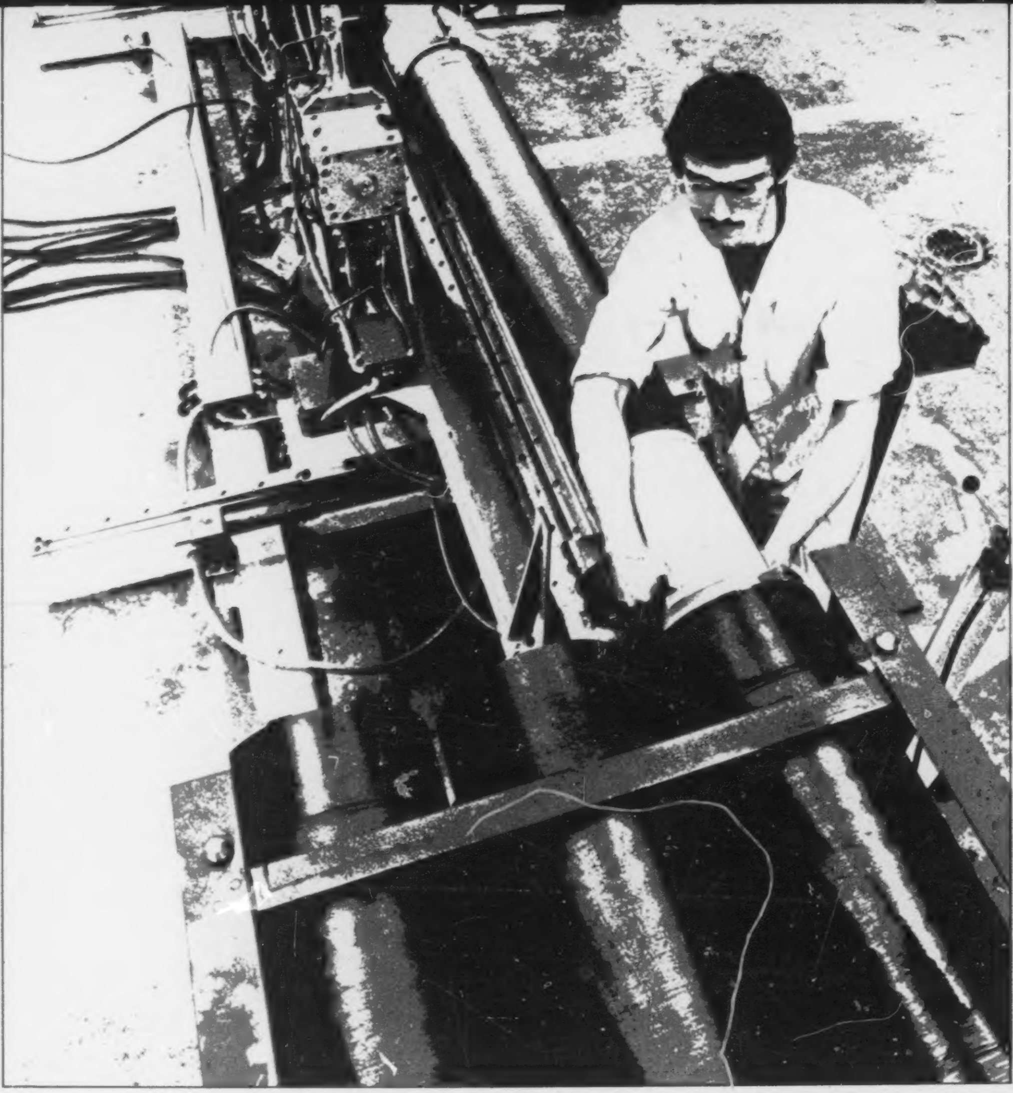
EXPORTS OF COMMERCIAL TRANSPORT AIRCRAFT

33,000 Pounds and Over Airframe Weight
Calendar Years 1977-1981

	1977	1978	1979	1980	1981
TOTAL NUMBER EXPORTED . . .	101	111	200	237	255
Canada	—	4	20	22	25
Latin America & Caribbean . . .	7	14	19	31	35
Europe.	32	36	68	109	108
Middle East.	20	17	17	9	21
Asia	22	24	60	53	34
Oceania.	4	6	6	7	19
Africa.	16	10	10	6	13
TOTAL VALUE (Millions of Dollars)	$1,936	$2,558	$4,998	$6,727	$7,180
Canada	—	132	373	299	584
Latin America & Caribbean . . .	59	187	423	640	1,027
Europe.	571	906	1,601	2,670	2,528
Middle East.	467	541	582	236	841
Asia	468	478	1,722	2,467	1,405
Oceania.	155	118	149	179	559
Africa.	216	196	148	236	236

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

Employment



At year-end 1981, aerospace industry employment dropped below the 11-year peak recorded at the end of the previous year. But **average** employment for 1981 topped the 1980 average.

This unusual situation stemmed largely from a reduction in the workforce engaged in commercial transport manufacture, reflecting fewer jetliner orders due to the depressed financial status of the world airline industry and increasing competition from abroad for such airline orders as were available. There was a resulting drop by year-end of some 50,000 workers in the aircraft manufacturing segment of the industry, only partially offset by gains in other areas of activity. At the end of 1981, the total aerospace labor force numbered 1,203,000, down 1.2 percent from the previous year's 1,218,000.

Computed on the annual average basis, overall employment in 1981 was 1,207,000, which compares with 1,187,000 in 1980. Thus, there was continuance of the annual average upward trend that began in 1978, but the rate of gain was sharply lower than in prior years—less than two percent in 1981, where increases of nine, 14, and seven percent were recorded respectively, in 1978-80. In terms of numbers of employees, the largest increase was in missiles and space activity—9,000 workers. There were moderate increases in the communications equipment and other products and services categories and, despite the decline in commercial aircraft production, the total aircraft manufacturing labor force grew by 2,000 workers.

Industry-wide, the number of production workers in the aerospace industry declined 5.6 percent, from 612,000 at the end of 1980 to 578,000 at year-end 1981. Production workers constituted just under half of the total labor force.

An indication of heightened research and development activity was a sharp rise in the number of scientists and engineers working on aerospace R&D programs; the National Science Foundation reports that their number increased more than 9,000 to a total of 96,100, the highest figure since 1969. Aerospace scientists and engineers represented 20.4 percent of all U.S. scientific/engineering personnel in R&D work.

The geographical pattern of aerospace employment remained constant in 1981. With 42 percent of the total, the Pacific region maintained its traditional dominance. New England (14.1 percent) ranked second, followed by the West North Central (10 percent) and Middle Atlantic (9.5 percent) regions.

The outlook for aerospace employment shows a turnaround from the 1981 decline. A survey conducted by Aerospace Industries Association indicates that the total labor force will increase to 1,220,000 by the end of 1982 and continue the upward trend to 1,269,000 employees by year-end 1983. Among other findings of the survey:

- Employment in the aircraft manufacturing sector will decline further in 1982, but the loss is expected to be less than one percent. For 1983, the survey projects a 3.8 percent increase in aircraft manufacturing employment as defense programs gain momentum and improved airline stability sparks new commercial transport orders. Aircraft employment should fall to 636,000 by the end of 1982—down 5,000—but should climb to 660,000 by year-end 1983.
- The growth in missiles/space employment experienced since 1977 is expected to continue in 1982/83 with increases of approximately two and four percent. Employment in missiles and space activity—262,000 at the end of 1981—should increase to 267,000 in 1982 and 278,000 by the end of 1983.
- Employment in the "other products" category—aerospace activities other than aircraft manufacturing or missile/space fabrication—is projected to increase 5.7 percent (to 317,000) in 1982 and a further 4.4 percent (to 331,000) in 1983.
- Helicopter manufacturing employment—which declined six percent in 1981 to 28,000—is expected to rebound. A total increase of nine percent is projected for 1982/83; year-end estimates are 28,600 for 1982 and 30,400 for 1983.

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GEOGRAPHIC DISTRIBUTION OF EMPLOYMENT OF MAJOR AEROSPACE MANUFACTURERS BY PRODUCT GROUP

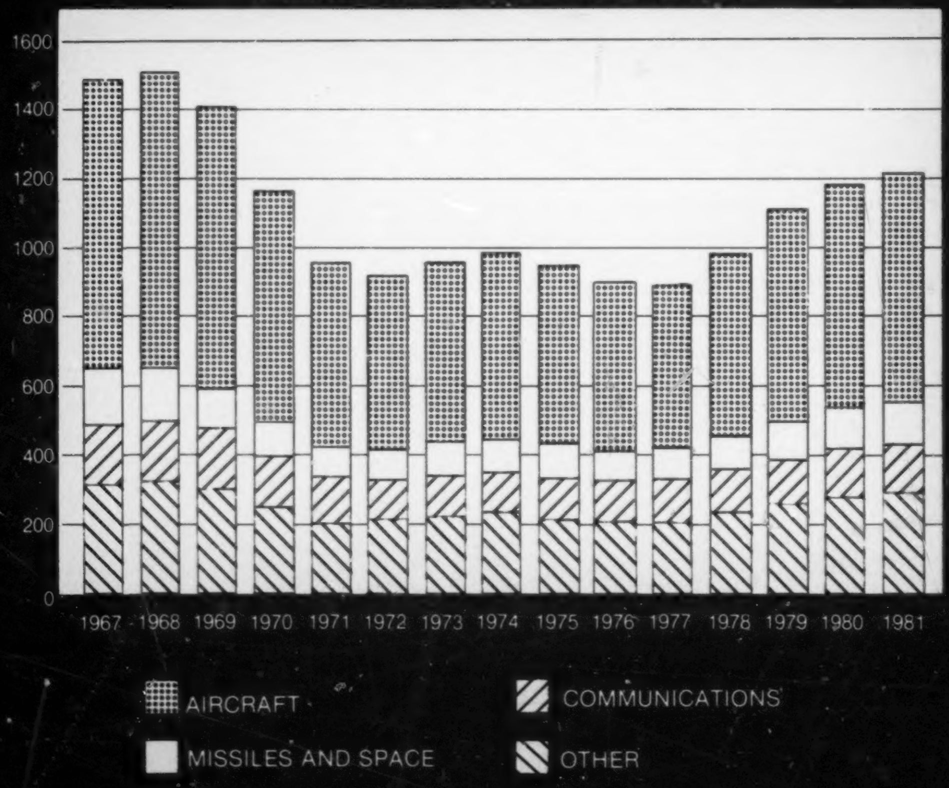
as of December 1981

Region	Percentage Distribution					
	Aircraft		Missiles	Space	Other	
	Civil	Military			Aerospace	Non-Aerospace
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
New England	18.6	12.2	20.3	11.4	15.6	6.8
Middle Atlantic	5.0	17.8	3.3		9.2	9.4
East North Central	12.3	3.4	1.0	5.2	6.2	0.8
West North Central	8.3	19.0	9.3		2.0	10.9
South Atlantic	3.4	7.9	8.6	4.0	14.9	2.3
South Central	5.4	11.6	1.0	4.6	3.9	7.7
Mountain	5.7	1.9	15.3	12.5	48.2	62.1
Pacific	41.3	26.2	41.2	62.3		

Source: Aerospace Industries Association, company reports.

AEROSPACE EMPLOYMENT BY PRODUCT GROUP

(Thousands of Employees; Annual Averages)



Source: AIA, based on data from Bureau of Labor Statistics

AEROSPACE EMPLOYMENT[a]

Calendar Years 1967-1981
(Annual Average, Thousands of Employees)

Year	TOTAL	Aircraft	Missiles & Space	Communications Equipment	Other
TOTAL EMPLOYMENT					
1967	1,484	834	157	179	314
1968	1,502	852	150	184	316
1969	1,402	804	124	179	295
1970	1,166	669	98	152	247
1971	951	531	88	129	203
1972	912	495	93	113	211
1973	956	525	93	116	222
1974	982	539	94	121	228
1975	941	514	93	116	218
1976	896	487	86	115	208
1977	893	482	83	121	207
1978	977	527	93	129	228
1979[r]	1,109	611	102	139	257
1980[r]	1,187	655	111	146	275
1981	1,207	657	120	150	280
PRODUCTION WORKERS					
1967	804	502	55	78	169
1968	807	506	52	80	169
1969	746	464	41	86	155
1970	604	369	31	77	127
1971	480	285	26	66	103
1972	455	266	28	55	106
1973	482	284	29	57	112
1974	494	292	29	59	114
1975	461	271	29	54	107
1976	433	251	28	54	100
1977	429	247	26	56	100
1978	476	275	29	61	111
1979[r]	562	332	33	67	130
1980[r]	598	356	35	69	138
1981	593	348	36	71	138

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] See Glossary for detailed explanation of "Aerospace Employment."

[r] Revised.

AEROSPACE EMPLOYMENT BY OCCUPATIONAL CLASSIFICATION AND PRODUCT GROUP

As of December 1977-1981

(Thousands of Employees)

Year	TOTAL	Production Workers	Scientists & Engineers	Technicians	All Others
TOTAL AEROSPACE					
1977	894	410	173	59	252
1978	1,032	519	170	64	279
1979	1,152	592	177	69	314
1980	1,218	612	196	78	332
1981	1,203	578	194	84	347
AIRCRAFT AND PARTS					
1977	482	263	78	23	118
1978	555	330	71	26	128
1979	654	397	76	28	153
1980	691	414	82	35	159
1981	641	377	77	38	149
MISSILES AND SPACE VEHICLES AND PARTS					
1977	191	65	61	14	61
1978	214	79	51	15	69
1979	220	82	51	15	72
1980	233	84	56	16	77
1981	262	96	59	19	88
OTHER RELATED PRODUCTS AND SERVICES					
1977	221	82	44	22	73
1978	263	110	48	23	82
1979	278	113	50	26	89
1980	294	114	57	27	96
1981	300	105	58	27	110

Source: Aerospace Industries Association, based on company reports and data from the Bureau of Labor Statistics.

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GEOGRAPHIC DISTRIBUTION OF EMPLOYMENT OF MAJOR AEROSPACE MANUFACTURERS BY OCCUPATIONAL CLASSIFICATION

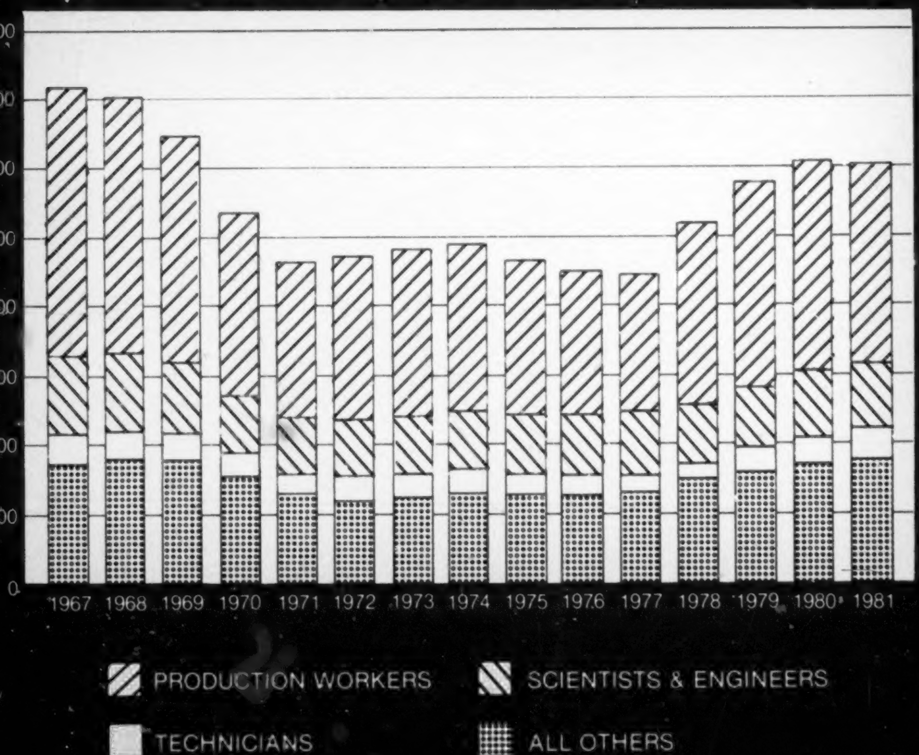
as of December 1981

Region	Percentage Distribution			
	TOTAL	Production Workers	Scientists & Engineers	Technicians
TOTAL	100.0%	100.0%	100.0%	100.0%
New England	14.1	18.2	10.8	10.9
Middle Atlantic	9.5	7.8	10.6	6.7
East North Central	5.6	6.8	3.9	3.9
West North Central	10.0	11.0	9.2	11.1
South Atlantic	7.0	5.7	7.5	7.2
South Central	6.2	7.5	4.5	4.3
Mountain	5.6	4.6	6.5	6.3
Pacific	42.0	38.4	47.0	49.6

Source: Aerospace Industries Association, company reports

AEROSPACE EMPLOYMENT BY OCCUPATIONAL TYPE

(Thousands of Employees; End of Year)



Source: AIA

LABOR TURNOVER RATES IN THE AEROSPACE INDUSTRY

Calendar Years 1967-1981
(Rates per 100 Employees per Year)

Year	Complete Missiles and Spacecraft	Aircraft			
		TOTAL	Airframes	Engines & Engine Parts	Other Parts & Equipment
ACCESSIONS					
1967	43.5	37.4	36.6	32.5	46.6
1968	40.7	28.1	27.1	22.9	39.8
1969	27.4	23.4	20.8	24.6	31.5
1970	19.3	16.1	13.9	15.1	26.2
1971	21.6	20.4	21.6	13.2	27.6
1972	20.4	24.0	21.6	21.6	37.2
1973	20.4	26.4	22.8	24.0	43.2
1974	22.8	25.2	24.0	18.0	39.6
1975	15.6	16.8	18.0	10.8	20.4
1976	14.4	18.0	16.8	13.2	25.2
1977	19.2	25.2	22.8	20.4	36.0
1978	21.6	31.2	30.0	24.0	42.0
1979	28.8	32.4	28.8	25.2	50.4
1980	26.4	22.8	20.4	18.0	36.0
1981	21.6	16.8	14.4	13.2	27.6
SEPARATIONS					
1967	34.0	32.2	27.9	34.1	43.9
1968	45.4	32.3	30.2	31.3	41.1
1969	46.6	33.2	30.8	32.3	42.4
1970	48.7	41.7	43.8	32.1	47.4
1971	37.2	36.0	32.4	34.8	50.4
1972	19.2	24.0	21.6	18.0	39.6
1973	24.0	25.2	22.8	21.6	37.2
1974	22.8	22.8	20.4	19.2	34.8
1975	18.0	26.4	26.4	22.8	32.4
1976	18.0	21.6	20.4	15.6	31.2
1977	18.0	21.6	21.6	15.6	27.6
1978	18.0	18.0	15.6	14.4	30.0
1979	18.0	20.4	16.8	15.6	34.8
1980	15.6	19.2	15.6	15.6	32.4
1981	14.4	21.6	18.0	20.4	30.0

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly).
r Revised.

WORK STOPPAGES
AIRCRAFT AND PARTS INDUSTRY
Calendar Years 1967-1981

Year	Number of Strikes	Number of Workers Involved	Man-Days Idle in Year
1967	22	28,800	160,800
1968	46	45,500	594,300
1969	26	76,400	1,564,600
1970	12	6,800	552,500
1971	24	17,200	465,500
1972	18	2,800	148,100
1973	13	4,500	99,100
1974	27	16,800	370,000
1975	20	22,800	1,245,600
1976	21	13,000	330,500
1977	21	46,700	1,832,200
1978	17	13,700	741,200
1979	12	6,600	103,400
1980	17	4,400	92,900
1981	12	6,100	188,900

Source: Department of Labor, Bureau of Labor Statistics, Division of Wages and Industrial Relations.

OCCUPATIONAL INJURY AND ILLNESS INCIDENCE RATES[a]
AEROSPACE AND ALL MANUFACTURING INDUSTRIES
Calendar Years 1972-1980

Year	All Manufacturing	Aircraft & Parts	Guided Missiles, Space Vehicles & Parts
1972	15.6	8.0	4.7
1973	15.3	7.4	4.5
1974	14.6	7.2	4.2
1975	12.5	5.9	3.3
1976	13.2	6.2	3.5
1977	13.1	6.0	3.0
1978	13.2	6.5	4.2
1979	13.3	7.1	3.1
1980	12.2	6.8	3.1

Source: Department of Labor, Bureau of Labor Statistics, "Occupational Injuries and Illnesses" (Annually).

[a] Defined as the number of injuries and illnesses per 100 man-years of work.

NA Not Available.

EMPLOYMENT IN THE AIRCRAFT AND PARTS INDUSTRY[a]

Calendar Years 1967-1981

(Annual Average, Thousands of Employees)

Year	TOTAL	Aircraft (Airframes)	Aircraft Engines and Parts	Other Aircraft Parts and Equipment
TOTAL EMPLOYMENT				
1967	833.6	487.8	221.0	144.4
1968	852.0	468.2	216.4	147.8
1969	804.4	456.7	205.0	142.7
1970	668.7	369.6	179.9	119.2
1971	530.8	287.7	150.6	92.6
1972	494.9	287.2	124.0	83.6
1973	524.9	300.5	132.6	91.8
1974	539.4	307.6	134.6	97.1
1975	514.0	292.8	126.3	94.9
1976	487.1	281.1	119.7	86.3
1977	481.7	270.4	120.9	90.4
1978	527.2	288.3	133.5	105.5
1979[r]	610.8	333.2	151.6	126.1
1980[r]	654.9	354.1	161.3	139.6
1981	656.7	360.6	158.1	138.1
PRODUCTION WORKERS				
1967	501.5	272.9	129.4	99.2
1968	505.5	280.9	123.9	100.7
1969	464.0	255.1	114.1	94.8
1970	369.3	197.0	95.0	77.3
1971	284.5	147.1	79.0	58.4
1972	266.2	145.1	68.6	52.5
1973	284.2	151.5	74.2	58.5
1974	291.9	154.4	75.2	62.3
1975	271.1	140.9	70.5	59.7
1976	250.7	132.2	65.6	53.0
1977	246.8	124.4	66.6	55.8[r]
1978	275.4	133.9	75.3	66.2[r]
1979[r]	332.1	165.9	86.4	79.8
1980[r]	355.8	176.0	92.0	87.8
1981	348.2	175.0	89.9	83.3

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly).

[a] See Glossary for detailed explanation of "Aerospace Employment."

EARNINGS IN AIRCRAFT AND PARTS PLANTS

Production Workers Only
(Includes Overtime Premiums)
Calendar Years 1967-1981

Year	TOTAL	Aircraft (Airframes)	Aircraft Engines and Parts	Other Aircraft Parts and Equipment
AVERAGE HOURLY EARNINGS				
1967	$ 3.45	$ 3.49	$ 3.42	$ 3.35
1968	3.62	3.64	3.65	3.53
1969	3.86	3.90	3.87	3.76
1970	4.11	4.17	4.10	3.99
1971	4.32[r]	4.32[r]	4.38	4.16
1972	4.62	4.65	4.72	4.42
1973	4.99	5.09	5.04	4.70
1974	5.42[r]	5.58[r]	5.41	5.05
1975	6.00	6.21[r]	6.04	5.47[r]
1976	6.44[r]	6.63[r]	6.46	5.95
1977	6.92	7.07	7.05	6.44
1978	7.54	7.70	7.80	6.93
1979	8.26	8.50	8.53	7.48[r]
1980	9.28[r]	9.67[r]	9.42	8.39[r]
1981	10.31	10.74	10.41	9.34
AVERAGE WEEKLY EARNINGS				
1967	$146.97	$147.28	$145.35	$146.73
1968	152.04	152.88	151.11	151.44
1969	161.35	163.41	158.28	159.05
1970	167.69[r]	169.30[r]	166.05	166.78
1971	172.37[r]	171.50[r]	173.53	170.98
1972	184.80[r]	180.89	193.05[r]	186.52
1973	202.10	199.53[r]	209.66[r]	199.75[r]
1974	220.59[r]	222.08[r]	221.81	213.62
1975	247.80	255.85[r]	247.04	228.65[r]
1976	263.40[r]	273.16[r]	259.69	245.74
1977	289.95	296.23	291.87	273.70
1978	318.19	324.17	325.26	298.68
1979	351.05	359.55	360.82	322.39[r]
1980	389.76[r]	404.21[r]	393.76[r]	357.41[r]
1981	425.80	443.56	421.61	396.02

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly).

[r] Revised.

EMPLOYMENT OF SCIENTISTS AND ENGINEERS[a] FOR RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND AEROSPACE INDUSTRY

as of January 1972-1981

Year	All Industries[b]	Aerospace[c]	Aerospace as a Percent of All Industries
1972	350,200	70,800	20.2%
1973	357,700	72,100	20.2
1974	360,000	70,600	19.6
1975	363,300	67,500	18.6
1976	364,400	66,900	18.4
1977	382,800	72,000	18.8
1978	403,700	82,000	20.3
1979	423,200[r]	86,500	20.4
1980	446,600[r]	86,900[r]	19.5
1981	470,200	96,100	20.4

Source: National Science Foundation.

[a] Scientists and engineers working less than full time have been included in terms of their full time equivalent number.

[b] All manufacturing industries and those non-manufacturing industries known to conduct or finance research and development.

[c] SIC codes 372 and 376.

[r] Revised.

COST PER R&D SCIENTIST OR ENGINEER[a] ALL INDUSTRIES AND AEROSPACE INDUSTRY

1971-1980

Year	All Industries[b]	Aerospace[c]
1971	$ 51,100	$ 65,500
1972	55,300	69,200
1973	59,200	70,800
1974	63,300	76,400
1975	66,500	85,100
1976	72,200	91,300
1977	76,100	92,300
1978	80,700	91,300
1979	87,700	95,700
1980	95,700	105,300

Source: National Science Foundation.

[a] The number of R&D scientists and engineers used to estimate the cost per R&D scientist or engineer is the arithmetic mean of the numbers of R&D scientists and engineers reported for January in two consecutive years. This number is then divided into the total R&D expenditures of each industry.

[b] All manufacturing industries and those non-manufacturing industries known to conduct or finance research and development.

[c] SIC codes 372 and 376.

EMPLOYMENT IN NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PROGRAMS

End of Fiscal Years 1960-1983

Year	TOTAL	NASA Employees	Contractor Employees^E
1960	46,768	10,268	36,500
1961 -	74,577	17,077	57,500
1962	137,656	22,156	115,500
1963	246,304	27,904	218,400
1964	379,084	31,984	347,100
1965	409,900	33,200	376,700
1966	393,924	33,924	360,000
1967	306,926	33,726	273,200
1968	267,871	32,471	235,400
1969	218,345	31,745	186,600
1970	160,850	31,350	129,500
1971	143,578	29,478	114,100
1972	138,800	27,500	111,300
1973	134,850	26,850	108,000
1974	125,220	25,020	100,200
1975	127,733	24,333	103,400
1976	130,739	24,039	108,000
1977	124,136	23,636	100,500
1978	124,637	23,237	101,400
1979	131,931	22,831	109,100
1980	135,613	22,613	113,000
1981	133,473	21,873	111,600
1982^E	144,852	21,652	108,200
1983^E	128,219	21,219	107,000

Source: NASA Briefing on the Budget of the United States (Annually).
E Estimate.
r Revised.

Finance

The aerospace industry recorded a 1981 net profit after taxes of almost $2.9 billion. Both earnings and sales figures represented all-time highs, but the rate of profit, measured as as a percentage of sales, was the same as in the previous year—4.3 percent—and well below the five percent peak of 1979.

The aerospace profit rate edged closer to, but remained below, the average for all U.S. manufacturing corporations, which was 4.7 percent in 1981. Measured as a percentage of assets, tne aerospace profit amounted to five percent and as a percentage of equity it was 15.6 percent; the comparable averages for all manufacturing industries were 6.7 percent and 13.6 percent.

The figures reflect a relatively strong financial position for the aerospace industry, which has in recent years achieved profit rates considerably better than traditional experience. Among major factors involved are the industry's continuing efforts to reduce overhead costs and higher levels of commercial sales, which usually generate greater earnings than do government contracts. The 4.3 percent profit-to-sales figure compares with 3.2 percent for the decade of the seventies and only 2.4 percent for the first half of that decade.

A factor in holding down profits is the necessity for large-scale financing of new plant and equipment at a time of high interest rates on borrowings. Aerospace plant and equipment expenditures reached an all-time high of more than $7 billion in 1980, but dropped to $6.4 billion in 1981; this was largely due to reduced need for investment as production facilities for the new generation of commercial transport aircraft neared completion. New plant and equipment requirements generated by the planned defense production buildup are expected to increase outlays in 1982 to a record $7.3 billion.

The aerospace balance sheet for 1981 showed increases in total assets—up $6.5 billion to $58.9 billion—and in net worth—up slightly less than $2 billion to $18.9 billion. Net working capital increased from $7.3 billion at the end of 1980 to $8.8 billion at year-end 1981.

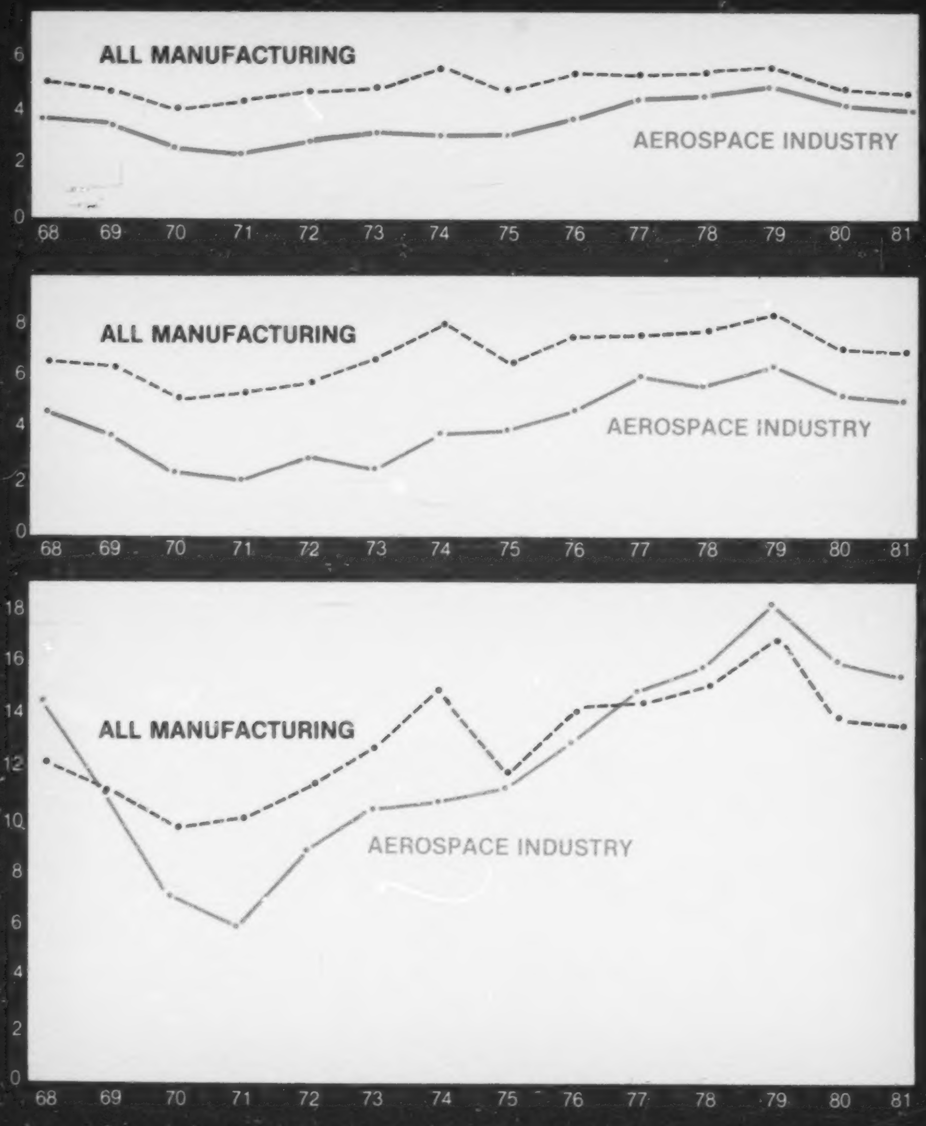
In terms of contract dollar value, McDonnell Douglas Corporation headed the list of companies awarded Department of Defense contracts in Fiscal Year 1981 with $4.4 billion. Other contractors in the top 10 included United Technologies Corporation ($3.8 billion); General Dynamics Corporation ($3.4 billion); General Electric Company ($3 billion); The Boeing Company ($2.7 billion); Lockheed Corporation ($2.7 billion); Hughes Aircraft Company ($2.6 billion); Raytheon Company ($1.8 billion); Grumman Corporation ($1.7 billion); and Chrysler Corporation ($1.4 billion). With the exception of Chrysler, all were in the top 10 in the preceding year.

The list of leading NASA contractors was headed by Rockwell International Corporation ($1.5 billion), the leader every year during the period of Space Shuttle development and production. Rounding out the top 10 were Martin Marietta Corporation, McDonnell Douglas Corporation, Computer Sciences Corporation, Thiokol Corporation, General Electric Company, Bendix Corporation, IBM Corporation, Boeing Services International and United Technologies Corporation.

A geographical breakdown of FY 1981 contracts for defense hard goods shows that the New England area led in production of aircraft-related hardware with 22.1 percent of the total dollar value. The West Central Area placed second with 18.7 percent and the Middle Atlantic region was third at 14.9 percent.

In contracts for missile and space systems, the Pacific area led by a wide margin with 47.1 percent, followed by New England (14.9 percent) and the Mountain region (10.5 percent). Pacific contractors also led in awards for electronics and communication equipment with 28.6 percent of the total; the South Atlantic area was second (19 percent) and the Middle Atlantic third (17.5 percent).

NET PROFIT AFTER TAXES



Source: Federal Trade Commission

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NET PROFIT AFTER TAXES AS A PERCENT OF SALES, ASSETS, AND EQUITY FOR ALL MANUFACTURING CORPORATIONS AND THE AEROSPACE INDUSTRY

Calendar Years 1968-1981

AS A PERCENT OF SALES

Year	All Manufacturing Corporations	Non-Durable Goods	Durable Goods	Aerospace[a] Industry
1968	5.1%	5.3%	4.9%	3.2%
1969	4.8	5.0	4.6	3.0
1970	4.0	4.5	3.6	2.0
1971	4.1	4.5	3.8	1.8
1972	4.4	4.6	4.3	2.4
1973	4.7	5.0	4.5	2.9
1974	5.5	6.4	4.7	2.9
1975	4.6	5.1	4.1	2.9
1976	5.4	5.5	5.2	3.4
1977	5.3	5.3	5.3	4.2
1978	5.4	5.4	5.5	4.4
1979	5.7	6.1	5.2	5.0
1980[r]	4.8	5.6	4.0	4.3
1981	4.7	5.2	4.2	4.3

AS A PERCENT OF ASSETS[b] AND EQUITY[b]

Year	All Manufacturing Corporations		Aerospace Industry[a]	
	Percent of Assets	Percent of Equity	Percent of Assets	Percent of Equity
1968	6.6%	12.1%	4.4%	14.2%
1969	6.1	11.5	3.5	10.6
1970	4.9	9.3	2.2	6.8
1971	5.1	9.7	2.0	5.8
1972	5.5	11.1	2.7	8.6
1973	6.5	12.8	2.4	10.3
1974	8.0	14.9	3.7	10.4
1975	6.2	11.6	3.8	11.0
1976	7.5	14.0	4.7	12.8
1977	7.6	14.2	5.7	14.9
1978	7.8	15.0	5.5	15.7
1979	8.4	16.5	6.3	18.4
1980[r]	6.9	13.9	5.2	16.0
1981	6.7	13.6	5.0	15.6

Source: Federal Trade Commission, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

[a] Based on a sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missles, space vehicles, and parts.

[b] Average of four quarters.

[r] Revised.

INCOME ACCOUNTS AEROSPACE COMPANIES

Calendar Years 1977-1981 (Millions of Dollars)

	1977	1978	1979	1980r	1981
Net Sales	$34,307	$41,689	$51,801	$60,638	$67,341
Income from Operations	2,338	3,023	3,606	3,659	3,735
Total Income before Income Taxes	2,296	2,726	3,711	3,647	4,518
Provision for Federal Income Taxes	1,003	1,154	1,489	1,341	1,641
As A Percent of Total Income	43.7%	42.3%	40.1%	36.8%	36.3%
Net Profit after Taxes	1,427	1,816	2,614	2,588	2,877
As a Percent of Net Sales	4.2%	4.4%	5.0%	4.3%	4.3%
Net Profit Retained in Business	1,012	1,255	1,897	1,790	1,985

Source: Federal Trade Commission, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

NOTE: Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

r Revised

BALANCE SHEET OF AEROSPACE COMPANIES

December 31, 1977-1981
(Millions of Dollars)

	1977	1978	1979	1980	1981
Assets:					
Current Assets					
Cash[a]	$ 2,138	$ 2,696	$ 3,001	$ 562	$ 1,043
U.S. Government Securities	31	119	79	2,250	2,777
Other Securities/Com'l Paper[a]	1,097	1,077	564		
Total Cash and U.S. Government Securities	$ 3,267	$ 3,894	$ 3,645	$ 2,812	$ 3,820
Receivables (Total)	3,564	4,475	5,237	5,991	5,932
Inventories (Gross)	10,568	15,968	20,491	26,497	29,966
Other Current Assets	677	840	844	834	870
Total Current Assets	$18,075	$25,195	$30,217	$36,135	$40,588
Net Plant, Property & Equipment	4,320	5,639	7,261	9,368	10,909
Other Non-Current Assets	3,705	5,144	7,041	6,935	7,400
Total Assets	$26,100	$35,978	$44,518	$52,437	$58,896
Liabilities:					
Current Liabilities					
Short Term Loans	$ 279	$ 171	$ 698	$ 1,198	$ 1,701
Advances by U.S. Gov't.	1,886	5,400	6,554	(b)	(b)
Trade Accts. & Notes Payable	2,757	3,296	4,266	5,095	5,193
Income Taxes Accrued	1,779	2,088	2,742	2,769	2,521
Installments Due on Long Term Debts	307	249	272	178	279
Other Current Liabilities	4,612	7,940	9,342	19,589	22,072
Total Current Liabilities	$11,621	$19,144	$23,873	$28,830	$31,767
Long Term Debt	4,117	3,637	3,975	4,525	5,347
Other Non-Current Liabilities	496	1,016	1,356	2,123	2,923
Total Liabilities	$16,233	$23,798	$29,204	$35,478	$40,036
Stockholders' Equity:					
Capital Stock	$ 3,452	$ 3,864	$ 5,013	$ 5,072	$ 5,622
Retained Earnings	6,415	8,315	10,301	11,888	13,239
Total Net Worth	$ 9,866	$12,180	$15,315	$16,959	$18,860
Total Liabilities & Stockholders' Equity	$26,100	$35,978	$44,518	$52,437	$58,896
Net Working Capital	$ 6,454	$ 6,051	$ 6,344	$ 7,304	$ 8,822

Source: Federal Trade Commission, "Quarterly Financial Report for Manufacturing, Mining and Trade Corps."

NOTE: Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles and parts.

[a] Effective 1980, deposits outside U.S. included in "Other Securities & Commercial Paper;" they previously were included in "Cash" (on hand and in banks).

[b] Included in "Other Current Liabilities."

[r] Revised.

NEW PLANT AND EQUIPMENT EXPENDITURES

Calendar Years 1960-1982
(Billions of Dollars)

Year	Total Nonfarm Business	All Manufacturing Industries	Durable Goods	Aerospace	
				Current Dollars	Constant Dollars 1972 = 100
1960	$ 48.63	$ 16.36	$ 8.28	$ 0.34	$ 0.49
1961	47.82	15.53	7.43	0.30	0.43
1962	51.28	16.03	7.81	0.40	0.57
1963	53.25	17.27	8.64	0.44	0.61
1964	61.66	21.23	10.98	0.41	0.56
1965	70.43	25.41	13.49	0.53	0.71
1966	82.22	31.37	17.23	1.17	1.52
1967	83.42	32.25	17.83	1.25	1.58
1968	88.45	32.34	17.93	1.23	1.49
1969	99.52	36.27	19.97	1.29	1.49
1970	105.61	36.99	19.80	0.88	0.96
1971	108.53	33.60	16.78	0.63	0.66
1972	120.25	35.42	18.22	0.68	0.68
1973	137.70	42.37	22.75	0.87	0.82
1974	156.98	53.21	27.44	1.51	1.31
1975	157.71	54.92	26.33	1.68	1.34
1976	171.45	59.95	28.47	1.69	1.28
1977	198.08	69.22	34.04	2.01	1.44
1978	231.24	79.72	40.43	3.22	2.15
1979	270.46	98.68	51.07	5.27	3.24
1980	295.63	115.81	58.91	7.03	3.96
1981[r]	321.49	126.79	61.84	6.43	3.32
1982[E]	345.11	136.81	67.24	7.25	3.47

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Quarterly Report. Aerospace constant dollars based on GNP deflator series of "Economic Report of the President" and "The Budget of the United States Government" (Annually).

NOTE: A comprehensive revision of new plant and equipment expenditure data for 1947-1977 was completed by the BEA in 1980, with results showing P&E expenditures to be substantially higher and growing at a faster rate than the previously published data. The revision also expanded coverage from "All Industries" to "Total Nonfarm Business" with the inclusion of four service industries.

[r] Revised.

[E] Estimate.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MAJOR CONTRACTORS

Fiscal Years 1977-1981

By rank according to net value of NASA prime contracts awarded during last fiscal year (Millions of Dollars)

Company	1977	1978	1979	1980	1981
TOTAL PROCUREMENTS	$3,532	$3,660	$4,212	$4,843	$5,408
Awards to Business Firms	2,838	2,954	3,417	3,868	4,273
Percent of TOTAL PROCUREMENTS	80%	81%	81%	80%	79%
Rockwell International Corp.	1,011	890	1,072	1,273	1,471
Martin Marietta Corp.	119	145	178	233	261
McDonnell Douglas Corp.	139	140	114	160	198
Computer Sciences Corp.	41	66	93	112	129
Thiokol Corp.	62	68	78	79	105
General Electric Co.	69	69	121	114	104
Bendix Corp.	91	95	100	97	103
IBM Corp.	66	73	93	84	95
Boeing Services International . . .	16	43	58	59	81
United Technologies Corp.	34	51	73	75	71
General Dynamics Corp.	79	64	47	46	66
United Space Boosters Inc.	4	18	33	43	65
Ford Aerospace & Commun.	26	30	35	48	62
Lockheed Engrg. & Mgmt. Co. Inc.	68	75	51	59	61
Hughes Aircraft Co.	39	73	71	68	53
Perkins Elmer Corp.	(a)	17	31	43	51
Planning Research Corp.	26	29	35	38	44
Lockheed Missiles & Space Co. . .	10	21	36	47	43
Boeing Co.	53	43	43	45	40
TRW Inc.	29	20	29	42	37
Pan American World Airways	12	12	27	32	34
Ball Corp.	8	18	22	21	30
Singer Co.	21	20	27	28	30
RCA Corp.	42	53	51	32	27
Air Products & Chemicals, Inc. . . .	7	23	19	17	26
Sperry Corp.	19	26	20	18	24
Northrop Services, Inc.	19	16	20	22	24
Teledyne Industries Inc.	14	9	13	20	23
Computer Sciences Tech. Assoc.	11	14	16	18	20
Kentron Intl. Inc.	4	4	14	23	16

Source: National Aeronautics and Space Administration, "NASA Annual Procurement Report," (Annually).

a Not listed in major contractors for indicated year.

DEPARTMENT OF DEFENSE MAJOR CONTRACTORS

Fiscal Years 1977-1981
Listed by rank according to net value of
prime contracts awarded during last fiscal year[a]
(Millions of Dollars)

Company	1977	1978	1979	1980	1981
TOTAL CONTRACTS	$50,385	$59,582	$63,252	$76,807	$97,389
McDonnell Douglas Corp.	2,574	2,863	3,229	3,247	4,409
United Technologies Corp.	1,585	2,400	2,554	3,109	3,776
General Dynamics Corp.	1,372	4,154	3,492	3,518	3,402
General Electric Co.	1,520	1,786	2,042	2,202	3,018
Boeing Co.	1,580	1,525	1,515	2,385	2,683
Lockheed Corp.	1,673	2,226	1,797	2,037	2,657
Hughes Aircraft Co.	1,093	1,489	1,557	1,819	2,552
Raytheon Co.	1,041	1,307	1,249	1,745	1,826
Grumman Corp.	1,428	1,180	1,364	1,322	1,710
Chrysler Corp.	620	743	809	971	1,414
Litton Industries, Inc.	609	1,557	832	652	1,385
Martin Marietta Corp.	426	539	519	809	1287
Philbro Corp.	(b)	(b)	(b)	(b)	1,223
Exxon Corp.	238	311	341	480	1,152
Tenneco Inc.	745	407	1,093	1,524	1,151
Rockwell International Corp.	1,480	890	684	969	1,126
Westinghouse Electric Corp.	802	539	660	932	1,125
FMC Corp.	245	361	352	835	1,052
Standard Oil Co. of CA	297	244	241	475	972
Sperry Corp.	652	612	778	845	928
RCA Corp.	364	565	487	589	877
Honeywell Inc.	457	545	658	687	838
IBM Co.	547	396	553	497	805
AT & T Co.	457	457	570	597	695
Texas Instruments Inc.	324	434	374	431	625
Northrop Corp.	1,047	586	800	1,227	623
General Motors Corp.	380	420	449	509	622
Coastal Corp.	84	154	178	250	616
Motor Oil Hellas	(b)	(b)	184	1,059	583
Singer Co.	350	282	346	435	565

Source: Department of Defense, "100 Companies and Their Subsidiary Corporations Listed According to Net Value of Prime Contract Awards," (Annually).

[a] Effective 1980, data include DOD contract awards for civil functions, while data for prior years were limited to military prime contract awards.

[b] Not in top 100 companies for the listed year.

PRIME CONTRACT AWARDS OF $10,000 OR MORE[a] FOR SELECTED MAJOR MILITARY HARD GOODS

By Geographic Region

Fiscal Years 1979, 1980, 1981

Program and Region	Millions of Dollars			Percent of Program Total		
	1979	1980	1981	1979	1980	1981
AIRCRAFT—TOTAL . . .	$13,259	$15,142	$19,021	100.0%	100.0%	100.0%
New England	3,198	3,812	4,204	24.1	25.2	22.1
Middle Atlantic	2,042	2,241	2,825	15.4	14.8	14.9
East North Central	747	1,034	1,362	5.6	6.8	7.2
West North Central . . .	2,728	2,551	3,562	20.6	16.9	18.7
South Atlantic	801	868	2,102	6.0	5.7	11.1
East South Central	113	169	181	0.9	1.1	1.0
West South Central . . .	2,208	2,755	2,484	16.7	18.2	13.1
Mountain	146	146	192	1.1	1.0	1.0
Pacific[b]	1,276	1,566	2,108	9.6	10.3	11.1
MISSILE & SPACE SYSTEMS—TOTAL . . .	$ 7,620	$ 9,321	$11,474	100.0%	100.0%	100.0%
New England	938	1,220	1,715	12.3	13.1	14.9
Middle Atlantic	546	596	768	7.2	6.4	6.7
East North Central	187	154	197	2.5	1.7	1.7
West North Central . . .	592	694	703	7.8	7.4	6.1
South Atlantic	613	772	916	8.1	8.3	8.0
East South Central	126	145	156	1.6	1.6	1.4
West South Central . . .	202	273	404	2.7	2.9	3.5
Mountain	449	572	1,208	5.9	6.1	10.5
Pacific[b]	3,967	4,895	5,406	52.1	52.5	47.1
ELECTRONICS & COMMUNICATIONS EQUIPMENT—TOTAL .	$ 8,953	$10,619	$12,871	100.0%	100.0%	100.0%
New England	698	1,086	1,231	7.8	10.2	9.6
Middle Atlantic	1,870	1,936	2,255	20.9	18.2	17.5
East North Central	572	686	878	6.4	6.5	6.8
West North Central . . .	490	879	1,004	5.5	8.3	7.8
South Atlantic	1,575	1,800	2,452	17.6	17.0	19.0
East South Central	38	58	71	0.4	0.5	0.5
West South Central . . .	581	581	858	6.5	5.5	6.7
Mountain	310	371	438	3.5	3.5	3.4
Pacific[b]	2,819	3,222	3,685	31.5	30.3	28.6

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).

[a] Effective 1980, data includes DOD contract awards for civil functions, while data for prior years were limited to military prime contract awards.

[b] Includes Alaska and Hawaii.

PRIME CONTRACT AWARDS OF $10,000 OR MORE[a] FOR RESEARCH, DEVELOPMENT, TEST & EVALUATION

By Region and Type of Contractor
Fiscal Year 1981
(Millions of Dollars)

REGION	TOTAL	Type of Contractor: Educational Institutions	Other Non-Profit Institutions[a]	Business Firms
TOTAL—Millions of Dollars . . .	$ 10,331	$ 711	$ 573	$ 9,047
New England	1,257	186	185	885
Middle Atlantic	1,064	57	15	992
East North Central	531	45	24	462
West North Central	225	7	1	217
South Atlantic	1,687	269	79	1,338
East South Central	131	4	3	124
West South Central	458	24	8	426
Mountain	808	37	2	769
Pacific[b]	4,172	82	256	3,833
PERCENT OF TOTAL	100.0%	100.0%	100.0%	100.0%
New England	12.2	26.2	32.3	9.8
Middle Atlantic	10.3	8.0	2.6	11.0
East North Central	5.1	6.3	4.2	5.1
West North Central	2.2	1.0	0.1	2.4
South Atlantic	16.3	37.8	13.9	14.8
East South Central	1.3	0.6	0.5	1.4
West South Central	4.4	3.4	1.4	4.7
Mountain	7.8	5.1	0.3	8.5
Pacific[b]	40.4	11.6	44.7	42.4

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).

[a] Includes contracts with other government agencies.

[b] Includes Alaska and Hawaii.

Accessions: see **Labor Turnover.**

Aeronautics: the science that treats of the operation of aircraft, also, the art or science of operating aircraft.

AIA: Aerospace Industries Association of America, Inc., formerly Aircraft Industries Association.

Aerospace Industry: the industry engaged in research,development and manufacture of aerospace systems, including manned and unmanned aircraft; missiles, space launch vehicles, and spacecraft; propulsion, guidance and control units for all of the foregoing; and a variety of airborne and ground based equipment essential to the test, operation, and maintenance of flight vehicles.

Aerospace Employment: annual average calculated as one-twelfth of sum of monthly estimates of total number of persons employed during a designated pay period by the aircraft and missile and space industries (SIC 372 and 376) plus estimated aerospace-related employment in the communications (SIC 3662) and instruments (SIC 381 and 382) industries and in certain other industries (SIC 28, 35, 73, 89, etc.).

Aerospace Payroll: estimated on the basis of average weekly earnings for a given calendar year for production workers plus an estimated annual salary for other employees.

Aerospace Sales: the AIA estimate of aerospace industry sales, developed by summing the (1) DOD expenditures for procurement of aircraft and missiles; (2) estimates of DOD expenditures for RDT&E of aircraft and missiles; (3) NASA expenditures for research and development; (4) outlays for space activities by DOD and other U.S. Government departments and agencies; (5) net sales of aerospace products to other than U.S. Government, including civil aircraft products (domestic sales and exports), commercial sales of space-related equipment, and exports of missiles and military aircraft (both commercial and FMS/MAP); and (6) non-aerospace sales of major aerospace companies.

Air Carriers: the commercial system of air transportation, consisting of domestic and international certificated and charter carriers.

Aircraft: all airborne vehicles supported either by buoyancy or by dynamic action. Used in this volume in a restricted sense to mean an airplane—any winged aircraft, including helicopters but excluding gliders and guided missiles.

Aircraft Agreement (Agreement on Trade in Civil Aircraft): negotiated in the Tokyo Round of the Multilateral Trade Negotiations, and implemented January 1, 1980, providing for elimination of tariff and non-tariff trade barriers in the civil aircraft sector.

Aircraft Industry: the industry primarily engaged in the manufacture of aircraft, aircraft engines and parts, aircraft propellers and parts, and aircraft parts and auxiliary equipment. A sector of the **Aerospace Industry.**

Airframe: the structural components of an airplane, such as fuselage, empennage, wings, landing gear, and engine mounts, but excluding such items as engines, accessories, electronics and other parts that may be replaced from time to time.

Airlines: see **Air Carriers.**

Appropriation (Federal Budget): an act of Congress authorizing an agency to incur obligations and make payments out of funds held by the Department of the Treasury.

Assets, Net: the sum of all recorded assets after reducing such amount by allowance of reserve for bad debts, depreciation and amortization, but before deducting any liabilities, mortgages or other indebtedness.

Astronautics: the art and science of designing, building and operating manned or unmanned space objects.

Average Weekly Hours: average hours for which pay was received; different from standard or scheduled hours.

Backlog: the sales value of orders accepted (supported by legal documents) that have not yet passed through the sales account.

Budget Authority: authority provided by the Congress; mainly in the form of **Appropriations,** which allows Federal agencies to incur obligations to spend or lend money.

Bureau of the Census: an agency of the Department of Commerce.

Bureau of Economic Analysis (BEA): an agency of the Department of Commerce.

Bureau of Labor Statistics (BLS): an agency of the Department of Labor.

Constant Dollars, see **Deflators.**

Deflators (Constant Dollars): used to reduce a price level to that comparable with the price level at a given different time, offsetting the effect of inflation. The Gross National Product in constant dollars is arrived at by dividing components of the current dollar figures by appropriate price deflators.

Depreciation: the general conversion of the depreciable cost of a fixed asset into expense, spread over its remaining life. There are a number of methods, all based on a periodic charge to an expense account and a corresponding credit to a reserve account.

Development: the process or activity of working out a basic design, idea or piece of equipment (see **Research**).

DOD: Department of defense.

DOE: Department of Energy.

DOT: Department of Transportation.

Durable Goods Industry: comprised of major manufacturing industry groups with SIC Codes 24, 25, and 32-39. All major manufacturing industry groups in SIC Codes 20-23 and 26-31 are considered nondurable goods manufacturing industry groups.

Earnings: the actual return to the worker for a stated period of time. Irregular bonuses, retroactive items, payments of various welfare benefits, and payroll taxes paid by employers are excluded.

Average Hourly Earnings: on a "gross" basis, reflecting not only changes in basic hourly and incentive wage rates, but also such variable factors as premium pay for overtime and late shift work, and changes in output of workers paid for an incentive plan.

Average Weekly Earnings: derived by muitiplying average weekly hours by hourly earnings.

ERDA: Energy, Research and Development Administration. ERDA was formed in 1974 to bring together activities previously scattererd among several agencies. The major elements covered were nuclear energy, fossil energy, solar and geothermal energy, conservation through increased efficiency and environmental controls. Most of these functions were assumed by the Department of Energy as of October 1, 1977.

Establishment: the basis for reporting to the Census of Manufacturers; an operating facility in a single location.

Evaluation: (Department of Defense): determination of technical suitability of material, equipment or a system; see **RDT&E**.

Expenditures (Federal Budget): see **Outlays**.

Exports: domestic merchandise including commodities which are grown, produced, or manufactured in the United States, and commodities of foreign origin which have been changed in the United States from the form in which they were imported, or which have been enhanced in value by further manufacture in the United States, and which are traded or sold to other nations.

FAA: Federal Aviation Administration (formerly the Federal Aviation Agency), an agency of the Department of Transportation.

Facility: a physical plant or installation including real property, building, structures, improvements and plant equipment.

Fiscal Year (Federal Budget): until June 30, 1976, year beginning July 1 and ending June 30, and designated by the year in which it ends. Beginning October 1, 1976, the fiscal years run from October 1 through September 30 and are designated by the year in which they end. A three month **Transition Quarter** from July 1 through September 30, 1976, belongs to neither fiscal year.

Flyaway Value: includes the cost of the airframe, engines, electronics, communications, armament and other installed equipment.

Foreign Military Sales (FMS): export sales to foreign governments arranged through the Department of Defense, whereby DOD recovers full purchase price and administrative costs; often mistakenly used to include foreign military aid and foreign commercial sales as well.

FY: see **Fiscal Year**.

General Agreement on Tariff and Trade (GATT): a multilateral treaty, suscribed to by over 80 governments which together account for more than four-fifths of world trade; its aim is to liberalize world trade; the only multilateral instrument that lays down agreed rules for international trade.

General Aviation: all civil flying except that of air carriers.

GNP (Gross National Product): the market value of the total output of goods and services produced by the nation's economy before deduction of depreciation charges and other allowances for business and institutional consumption of durable goods. It includes the purchase of goods and services by consumers and government, gross private domestic investment and net exports.

Helicopter: a rotary-wing aircraft which depends principally for its support and motion in the air upon the lift generated by one or more power-driven rotors, rotating on substantially vertical axes. A helicopter is a V/STOL.

Heliport: an area, either at ground level or elevated on a structure, that is used for the landing and take-off of **helicopters** and includes some or all of the various facilities useful to helicopter operations such as helicopter parking, hangar, waiting room, fueling and maintenance equipment.

Helistop: a minimum facility **heliport**, either at ground level or elevated on a structure for the landing and takeoff of **helicopters** but without such auxiliary facilities as waiting room, hangar parking, etc.

ICBM: Intercontinental Ballistic Missile, with a range of more than 5,000 miles.

Imports: classified as "general imports" or "imports for consumption." This volume refers generally to "imports for consumption," which are entries for immediate consumption plus merchandise withdrawn from bonded storage warehouses for consumption. Data are compiled from Import Entries filed with U.S. Customs officials, and are in general based on the market value or price in the foreign country at the time of exportation of such merchandise, including the cost of containers and coverings, as well as other charges and expenses incidental to placing the merchandise in condition, packed and ready for shipment to the United States, but excluding import duties, insurance, freight and other charges incidental to arrival of the goods in the United States. The foreign values of imported merchandise are converted into U.S. currency at the rate of exchange prevailing on the day the merchandise is shipped to the United States.

Income:

- **Net Operating Income:** total net sales (see **Sales**) less total operating costs.
- **Net Income (Before Income Taxes): Net Operating Income** plus or minus **"Other Income and Expenses."**
- **Other Income and Expenses:** includes interest income, royalty income, capital gains and losses, interest expense, cash discounts, etc.
- **Net Income (After Income Taxes): Net Income (Before Taxes)** less federal income taxes.

Labor Turnover: the gross movement of wage and salary workers into and out of employed status with respect to individual establishments. This movement is divided into two broad types: **Accessions** and **Separations**. Each type of action is accumulated for a calendar month or year and expressed as a rate per 100 employees. The data relate to all employees, full- or part-time, permanent or temporary.

- **Accessions:** the total number of permanent and temporary additions to the employment roll, including both new and rehired employees.
- **Separations:** terminations of employment during the calendar month or year, classified according to cause: quits, layoffs, and other separations.

Man-Hours: in measuring labor input, takes into account both the number of production workers and their actual hours of work. The Bureau of Labor Statistics covers all hours paid for, whether worked or not, when the employee was at the plant. One man-hour means one hour of a person's time.

Manufacturing Industries: those **establishments** engaged in the mechanical or chemical transformation of inorganic or organic substances into new products, and usually described as plants, factories, or mills, which characteristically use power-driven machines and materials handling equipment; also establishments engaged in assembling component parts of manufactured products if the new product is neither a structure nor other fixed improvement.

Merchandise Trade Balance: the difference between the value of U.S. goods exported to other countries and foreign goods imported into this country. The trade balance is generally regarded as "favorable" when **exports** exceed **imports** — a trade surplus — and "unfavorable" when **imports** exceed **exports** — a trade deficit.

Military Assistance Programs (MAP): grant aid given to qualifying countries.

Missile: sometimes applied to space launch vehicles, but more properly connotes automated weapons of warfare, *i.e.*, a weapon which has an integral system of guidance, as opposed to the unguided rocket.

Multilateral Trade Negotiations (MTN): a forum within the **GATT** in which countries negotiate to overcome their trade problems. In September 1973, in Tokyo, over 100 nations launched new multilateral trade negotiations, called the "Tokyo Round," covering both tariff and non-tariff barriers to trade in industrial and agricultural products, and improvements in the **GATT** itself.

NASA: National Aeronautics and Space Administration.

NATO: North Atlantic Treaty Organization.

New Obligational Authority (Federal Budget): see **Budget Authority**.

Non-Aerospace Products and Services: includes all non-aircraft, non-space vehicle, and non-missile products and services produced or performed by those companies and/or establishments whose principal business is the development and/or production of aircraft, aircraft engines, missile and spacecraft engines, missiles and/or spacecraft.

OASD: Office of the Assistant Secretary of Defense.

Obligations (Federal Budget): commitments made by Federal agencies to pay out money for products, services or other purposes — as distinct from the actual payments. Obligations incurred may not be larger than budget authority.

Other Aerospace Products and Services: all conversions, modifications, site activation, other aerospace products (including drones) and services, basic and applied research in the sciences and in engineering, and design and development of prototype products and processes.

Outlays: checks issued, interest accrued on the public debt, or other payments made, net of refunds and reimbursements.

Overtime Hours: that portion of the gross average weekly hours which was in excess of regular hours and for which premium payments were made.

Payroll: includes the gross earning paid in the calendar year to all employees on the payroll of operating manufacturing **establishments**. Includes all forms of compensation paid directly to workers such as salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. Does not include employers' Social Security contributions or other nonpayroll labor costs such as employees' pension plans, group insurance premiums, and workmen's compensation.

Passenger-Mile: one passenger moved one mile.

Procurement: the process whereby the executive agencies of the Federal Government acquire goods and services from enterprises other than the Federal Government.

Production Workers: includes working foremen and all non-supervisory workers (including leadmen and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, janitorial services, product development, auxiliary production for plant's own use and record keeping and services closely associated with the above production operations.

R&D: Research and Development.

Research: systematic study directed toward fuller scientific knowledge or understanding of the subject studied. Research is classified as either **basic** or **applied** according to the objectives of the sponsoring agency.

Basic Research: with the objective of gaining fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products in mind.

Applied Research: with the objective of gaining knowledge or understanding necessary for determining the means by which a recognized and specific need may be met.

Development: the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, or methods including design and development of prototype and processes.

Independent Research and Development (IR&D): a term devised by the Department of Defense and used by Federal agencies to differentiate between a contractor's research and development technical effort performed under a contract, grant, or other arrangement (R&D) and that which is self-initiated and self-funded (IR&D).

Industrial Research and Development: research and development work performed within company facilities, funded by company or Federal funds, and excluding company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

RDT&E (Department of Defense): Research, Development, Test and Evaluation.

Research: see **R&D**.

Rotorcraft: an aircraft which in all its usual flight attitudes is supported in the air wholly or in part by a rotor or rotors, *i.e.*, airfoils rotating or revolving about an axis (see **Helicopter**).

Sales: net of returns, allowances, and discounts; the dollar value of shipments less returns and allowances, including dealer's commission, if any, which have passed through the sales account.

Satellite: a body that revolves around a larger body, such as the moon revolving around the earth, or a man-made object revolving about any body such as the sun, earth, or moon.

Separation: see **Labor Turnover**.

SIC (Standard Industrial Classification): a system developed by the U.S. Government to define the industrial composition of the economy, facilitating comparability of statistics. See **Aerospace Industry** for explanation of SIC codes applicable to the aerospace industry.

Space Vehicle: an artificial body operating in outer space (beyond the earth's atmosphere).

Stockholder's Equity: assets minus all obligations of the corporation, except those to stockholders. Annual data are average equity for the year (using four end-of-quarter figures.) For details, see Federal Trade Commission's "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

STOL: short take-off and landing aircraft.

Test (Department of Defense): an experiment designed to assess progress in attainment or accomplishment of development objectives (see **RDT&E**).

Thrust: the driving force exerted by an engine, particularly an aircraft or missile engine, in propelling the vehicle to which it is attached.

Ton-Mile: one ton moved one mile.

Total Obligational Authority: the sum of **budget authority** granted or requested from the Congress in a given year, plus unused **budget authority** from prior years.

Trade Balance: see **Merchandise Trade Balance.**

Transition Quarter (Tr. Qtr.): the three-month interval from July 1, 1976 to September 30, 1976. Beginning with the 1977 budget, the **fiscal year** (FY) runs from October 1 through September 30. To facilitate the conversion, this transition period was provided between FY 1976 and FY 1977 as a separate accounting period belonging to neither year.

Turbine, Turbo: a mechanical device or engine that spins in reaction to a fluid flow that passes through or over it. Frequently used in "turboprop" or "turbojet."

U.K.: United Kingdom.

U.S.: United States of America.

USA: United States Army, an agency of the U.S. Department of Defense.

USAF: United Sates Air Force, an agency of the U.S. Department of Defense.

USN: United States Navy, an agency of the U.S. Department of Defense.

USSR: Union of Soviet Socialist Republics.

Utility Aircraft: an aircraft designed for general purpose flying.

V/STOL: vertical short take-off and/or landing aircraft.

Wages: the payroll (see **Payroll**) of production and related workers.

—A—

ACCESSIONS, 136

ACTIVE CIVIL AIRCRAFT, 88-91

AERONAUTICS, 109

AEROSPACE INDUSTRY,
  Average Earnings, 139
  Backlog, 16
  Balance of Trade, 119
  Balance Sheet, 147
  Comparison with All Manufacturing and Durable Goods, 17-20, 145, 148
  Employment, 18, 20, 133-141
  Exports, 22, 119, 122-129
  Finance, 145-152
  Imports, 119-121, 126-128
  Payroll, 19
  Profits, 145, 146
  Research and Development, 72-76, 101-115
  Sales, 13-15, 17, 108, 145, 146

AIR CARGO, 79, 83, 86, 91, 102, 103

AIR CARRIERS, See Airlines

AIR FORCE,
  Aircraft Acceptances, 41, 44
  Aircraft Procurement, 45, 46
  Major Missile Systems, 51-53
  Missile Procurement, 50, 55
  RDT&E, 111, 112, 114, 115

AIR TRANSPORTATION, 21, 77-94
  See Also Individual Subjects

AIRCRAFT, 29-47, 80-82, 88-92
  Active Civil, 21, 80-82, 88-92
  Airlines, 21, 79-94, 102-103
  Backlog, 16, 33, 36
  Civil, 34, 35
  Employment, 133-139
  Exports, 34, 36, 38, 122-125, 127-129
  Flyaway Cost, Military, 40-44
  Imports, 120, 121, 127, 128
  Military, 34, 40-47, 120-122, 125
  On Order, 36
  Outlays, DOD, 24, 25, 27, 45
  Prime Contract Awards, 113, 151, 152
  Procurement, DOD, 24, 25, 27, 45-47
  Production, 32-47
  RDT&E, DOD, 24, 25, 112-114
  Sales, 13, 15, 32
  Transports, 22, 34-37, 40, 41, 44, 120, 122, 125, 129

AIRLINES,
  Domestic, 83-87, 102, 103
  Finances, 85-87

  Flight Equipment, 80-82, 85, 88-91
  Foreign, 79-81
  Helicopter, 89, 91, 102, 103
  Miles Flown, 79, 83, 102
  Passenger Miles, 79, 83, 84, 102
  Traffic, 79, 83, 102
  U.S. Fleet, 88, 89
  World Airline Fleet, 21, 80-82

AIRMAN CERTIFICATES, 93

AIRPORTS, 94

APPLIED RESEARCH AND DEVELOPMENT, 107

ARMY,
  Aircraft Acceptances, 43, 44
  Aircraft Procurement, 45, 46
  Major Missile Systems, 52, 53
  Missile Procurement, 50, 55
  RDT&E, 111, 112, 114, 115

ASSETS,
  Aerospace Industry, 145, 147
  Airlines, 85

ASTRONAUTICS,
  Outlays, 24, 25
  RDT&E, 24, 25, 112

ASTRONAUTS, 66-68

—B—

BACKLOG,
  Aerospace, 16
  Aircraft, 16, 33
  Engines, 16, 33
  Missiles, 16, 56, 57
  Space, 16, 69
  Transport Aircraft, 36

BALANCE OF TRADE, 119

BALANCE SHEET, AEROSPACE COMPANIES, 147

BASIC RESEARCH FUNDS, 107

BOMBERS,
  Exports, 122, 125
  Flyaway Costs, 40
  Production, 40

BUSINESS FLYING, 91, 92, 97, 100, 101

—C—

CAPITAL SPENDING, 148

CARGO TON-MILES, 79, 83

CERTIFICATED PILOTS, 93

CIVIL AIRPORTS, 94

COMMERCIAL FLYING, See
  Business Flying

COMMUNICATIONS EQUIPMENT,
  Contract Awards, 113, 151
  Employment, 133

COMMUNICATIONS SATELLITES, 61-63

CONSTANT DOLLARS, 13-17, 32, 33, 56, 57, 69, 71, 101, 148

CONTRACT AWARDS
  DOD, 113, 150-152
  NASA, 149

—D—

DEFENSE CONTRACTORS, 150

DEFLATORS, 17

DELIVERIES, See Production

DEPARTMENT OF DEFENSE,
  Aerospace Sales, 14, 26, 27
  Aircraft,
    Flyaway Cost, 40-44
    Outlays, 24, 25, 27, 45
    Procurement, 24, 25, 45-47
    RDT&E, 24, 25, 112-114
    Aeronautics, R&D, 109
    Astronautics, 24, 25, 112
  Contractors, 150
  Missiles, 24, 25, 27, 50-57
    Outlays, 24, 25, 27, 54, 55
    Procurement, 24, 25, 27, 50, 54, 55
    RDT&E, 24, 25, 112, 113, 115
  Outlays, 23-25
    Aerospace, 24-28
    Aircraft, 24, 25, 27, 45
    Astronautics, 24, 25
    Functional Title, 24, 25
    Missiles, 24, 25, 27, 54
    Personnel, 24, 25
    R&D, 110
    RDT&E, 24, 25
  Personnel, 24, 25
  Prime Contract Awards, 113, 150-152
  Procurement, 24, 25, 28, 45-47, 50, 54, 55
  R&D, 109, 110
  RDT&E, 24, 25, 111-115, 152
  Space Activities, 70, 71

DEPARTMENT OF ENERGY, 70, 71, 110

DEPARTMENT OF TRANSPORTATION,
  Aeronautics R&D, 109

DURABLE GOODS INDUSTRY,
  Employment, 20

  New Plant and Equipment
    Expenditures, 148
  Profits, 145
  Sales, 17

—E—

EARNINGS,
  Companies, 145, 146
  Employees, 19, 139

ELECTRONICS,
  Prime Contract Awards, 113, 151

EMPLOYMENT, 18, 20, 130-141
  All Manufacturing, 18, 20
  Durable Goods, 20
  NASA, 141
  Scientists and Engineers, R&D, 140

ENGINES,
  Aircraft,
    Backlog, 33
    Exports, 122, 126
    Imports, 120, 126
    Sales, 32
  Missiles and Space Vehicles,
    Backlog, 57
    Exports, 122
    Sales, 57

ERDA, 110

EXPORT-IMPORT BANK, 123

EXPORTS, 23, 34, 38, 44, 119-129
  Aerospace, 23, 119-129
  Balance of Trade, 119
  Civil, 22, 34, 122, 124, 127-129
  Engines, 122, 126
  General Aviation, 34, 122, 124, 128
  Helicopters, 34, 44, 122, 124, 125, 127
  Military, 22, 34, 44, 122, 125
  Transports, 22, 34, 122, 124, 125, 129
  U.S. Exports, 22
  Used Aircraft, 122, 124, 125

—F—

FEDERAL (U.S. GOVERNMENT),
  Aerospace Sales, 14, 15, 26, 27
  Backlog, 16
  Outlays, 23
  Research and Development, 110

FIGHTER AIRCRAFT,
  Exports, 122, 125
  Flyaway Cost, 40-42, 44
  Procurement, 46, 47
  Production, 40-42, 44
  RDT&E, 114

FINANCES,
  Airlines, 85-87
  Government, See Outlays and Federal
  Industry, 142-152

FLYING HOURS, 92

FOREIGN TRADE, 22, 116-129, See also
  Imports, Exports

FUNDS, RESEARCH, 106-109

—G—

GEOGRAPHIC DISTRIBUTION,
  Airports, 94
  Civil Helicopter Fleet, 100, 101
  Contract Awards, 151, 152
  Employment, 132, 135
  Exports, 127-129
  Heliports, 98
  Imports, 127-129

GENERAL AVIATION,
  Active Civil Aircraft, 90-92
  Exports, 34, 122, 124, 128
  Hours Flown, 92
  Imports, 120, 128
  Shipments, 34, 35, 39

GLIDER PILOTS, 93

GOVERNMENT, See Federal

GROSS NATIONAL PRODUCT, 17, 23
  Deflator Series, 17

—H—

HELICOPTERS, 34, 35, 38, 40, 42-44, 82,
  89-91, 93, 95-103
  Active Civil, 82, 89-91
  Civil Helicopter Fleet by State, 100, 101
  Designation Chart, 99
  Exports, 34, 38, 122, 124, 125, 127
  Flyaway Cost, Military, 40, 42-44
  Imports, 120, 121, 127
  Military, 38, 40, 42-44
  Operators, 97
  Production, 34, 35, 38, 40, 42-44
  Traffic, 102, 103
  U.S. Airlines, 83-91
  World Civil Airlines, 79-82

HELIPORTS, 98

HELISTOPS, 98

HOURS FLOWN, GENERAL AVIATION, 92

—I—

IMPLICIT PRICE DEFLATORS, 17

IMPORTS,
  Aerospace, 119, 120
  Aircraft, 121
  Engines, 126
  General Aviation, 128
  Helicopters, 127

INCOME ACCOUNTS, 146

INDUSTRIAL RESEARCH AND DEVELOPMENT, 106-109

INJURY RATES, 137

INSTRUCTIONAL FLYING, 91, 92

INVESTMENT IN EQUIPMENT
  Aerospace Industry, 148
  Durable Goods Industries, 148
  Manufacturing Industries, 148
  Non-farm Business, 148
  U.S. Airlines, 85

—L—

LABOR TURNOVER RATES, 136

LIABILITIES, Corporate, 147

—M—

MAJOR CONTRACTORS, 149, 150

MANPOWER, See Employment, 133-141

MANUFACTURING INDUSTRIES,
  Employment, 18, 20
  New Plant and Equipment Expenditures, 148
  Profits, 145
  Payroll, 19
  Sales, 17
  Work Injury Rates, 137

MILES FLOWN, 79, 83, 84, 102

MILITARY EXPORTS, 22, 34, 44, 122, 125, 126

MISSILES,48-57
  Backlog, 16, 56
  Employment, 133-135
  Engines, 57
  Exports, 122
  Major Missile Systems, 51-53
  Outlays, 24, 25, 27, 54, 55
  Prime Contract Awards, 113, 151
  Procurement, 24, 25, 27, 50, 54, 55
  RDT&E, DOD, 24, 25, 112, 113, 115
  Sales, 13, 15, 56, 57

—N—

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
  Aeronautics, R&D, 109
  Aerospace Sales, 14
  Budget Authority, 70-72
  Construction of Facilities, 72, 73
  Contractors, 149
  Employment, 141
  Outlays, 26, 27, 73
  Research and Development, 72-74, 109, 110
  Research and Program Management, 72, 73

NATIONAL DEFENSE, 23, 26

NAVY,
  Aircraft Acceptances, 42, 44
  Aircraft Flyaway Cost, 42, 44
  Aircraft Procurement, 45-47
  Major Missile Systems, 51-53
  Missile Procurement, 50, 54

—O—

ORDERS, Jet Transports, 36

OUTLAYS,
  Aircraft, 24, 25, 27, 45
  Aerospace, 24-28
  Astronautics, 24
  Federal, 23
  Missiles, 24, 25, 27
  National Defense, 23, 26
  RDT&E, 24, 25, 112

OPERATING REVENUE,
  U.S. Airlines, 86, 87

—P—

PASSENGER-MILES, 79, 83, 84, 102

PASSENGERS CARRIED, 79, 83, 84, 102

PAYROLL, 19

PILOTS, 93

PLANES, See Aircraft

PLANT AND EQUIPMENT EXPENDITURES, 148

PRIME CONTRACT AWARDS,
  DOD, 113, 150-152
  NASA, 149

PROCUREMENT, DOD,
  Aerospace Products and Services, 14, 24-28
  Aircraft, 24, 25, 27, 45-47

  Missiles, 24, 25, 27, 50, 54, 55
  Total, 24, 25

PRODUCTION, Aircraft, 32-47
  General Aviation Aircraft, 34, 35, 39
  Helicopters, 34, 35, 38
  Military Aircraft, 34, 40-44
  Transport Aircraft, 34-37

PROFITS, 145, 146

—R—

RDT&E, See Research, Development, Test and Evaluation

RESEARCH, Applied and Basic, 107

RESEARCH AND DEVELOPMENT, 104-115
  Aeronautics, 109
  DOD, 109, 110
  DOT, 109
  Energy, 108, 110
  Federal Funds, 106-109
  Industrial, 106-109
  NASA, 109-110
  Scientists and Engineers, 140

RESEARCH AND PROGRAM MANAGEMENT, NASA, 72, 73

RESEARCH, DEVELOPMENT, TEST & EVALUATION, DOD
  Aircraft, 24, 25, 112-114
  Astronautics, 24, 25, 112
  By Agency, 111, 112, 114
  Contract Awards, 113, 152
  Missiles, 24, 25, 112, 113, 115
  Outlays, 24, 25, 112
  Total, 24, 25, 112

ROCKETS, See Missiles

ROTARY WING, See Helicopters

—S—

SALES,
  Aerospace, 13-15, 17
    And National Economy, 17
    By Customer, 14, 15
    By Product, 13, 15
  Aircraft, 13, 15, 33
  Constant Dollars, 13-15, 17
  Durable Goods, 17
  Manufacturing Industries, 17
  Missiles, 13, 15, 56
  Non-Aerospace, 13-15
  Space, 13, 15, 69

SCIENTISTS AND ENGINEERS, 134, 135, 140

SEPARATIONS, 136

SPACE, 58-76
  Backlog, 69
  DOD, 61-63, 70, 71, 75, 76
  Employment, 133-135, 141
  Launchings, 60-63
  Manned Space Flights, 66-68
  NASA, 61-63, 70-74
  Procurement, 76
  Programs, 74-76
  RDT&E, 76
  Sales, 13, 15, 69
  Satellites, 61-63
  Space Launch Vehicles, 64, 65
  Spacecraft Record, 60

STOCKHOLDERS' EQUITY, 147

STRIKES, 137

STUDENT PILOTS, 93

—T—

TAXES, 146

TRADE BALANCE, 119

TRANSPORTATION,
  Air, 77-94
  Helicopter, 95-103
  See Also Individual Subjects

TRANSPORTS,
  Civil, 34-37
  Exports, 22, 34, 122, 124, 125, 129
  Imports, 120
  Military, 40-44
  On Order, 36
  Production, 34, 35, 37, 40-44
  Specifications, 37

TURBOJET AIRCRAFT, 21, 80, 88, 91

TURBOPROP AIRCRAFT, 21, 81, 82, 88, 89, 91

TURNOVER, LABOR, 136

—U—

USED AIRCRAFT,
  Civil Imports, 120, 121
  Civil Exports, 122, 124
  Military Exports, 122, 125

USED AIRCRAFT ENGINES,
  Exports, 127

USAF, See Air Force

U.S. AIRLINES
  Assets, 85
  Finances, 85-87

Fleet, 88-91
Net Investment, 85
Operating Revenues, 86, 87
Traffic, 83, 84, 102, 103

USN, See Navy

UTILITY AIRCRAFT, See General Aviation

—V—

VERTICAL LIFT AIRCRAFT, See Helicopters

—W—

WAGES, 139

WORKING CAPITAL, 147

WORK INJURY RATES, 137

WORK STOPPAGES, 137

WORLD AIRLINES,
Fleet, 21, 80-82
Traffic, 79

NOTES

NOTES

MEMBERS

- Abex Corporation
- Aerojet-General Corporation
- Aeronca, Inc.
- Avco Corporation
- The Bendix Corporation
- The Boeing Company
- CCI Corporation
  - The Marquardt Company
- Colt Industries Inc.
  - Chandler Evans, Inc.
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- Criton Corporation
- E-Systems, Inc.
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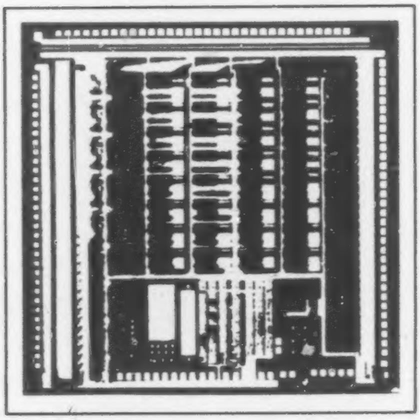

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The cover and chapter art throughout this edition of *Aerospace Facts and Figures* feature computer-inspired graphics–not an original theme in the contemporary business environment, but one particularly relevant to the aerospace industry, which spawned the large-scale development and application of computers, and continues to incorporate computer advances in all aspects of its design and manufacture of aircraft, missiles, and space products.

CONTENTS

6 Foreword

8 Aerospace Summary

28 Aircraft Production

48 Missile Programs

58 Space Programs

80 Air Transportation

100 Helicopter Transportation

108 Research and Development

122 Foreign Trade

138 Employmemt

152 Finance

162 Glossary

168 Index

FOREWORD

Throughout this 31st edition of *Aerospace Facts and Figures* there is one recurring note: activity in the civil aircraft manufacturing segment of the aerospace industry was depressed in 1982 under the combined effects of the recession, the financial difficulties of the world's airlines, high interest rates for financing aircraft purchases, and strong competition from foreign manufacturers. This civil aircraft decline influenced several areas of the industry's performance—total sales, of course, as well as backlog, profits, exports, trade balance and employment

The net result was essentially a zero growth year, technically a decline in real terms but a decline of negligible proportions. A zero growth year is not one to rejoice about, but in this instance 1982 must be reckoned a good year, by and large, because the sales volume wound up just a shade below that of 1981—and 1981 was the industry's all-time *real* peak year. In inflation-adjusted terms, 1982 was the second best sales year in the industry's history and in current dollars sales were the highest ever.

The industry's profit rate dipped sharply, from 4.4 percent of sales in 1981 to 3.2 percent in 1982. As in the past, it continued to remain well below that of total U.S. manufacturing industry, which also fell because of the recession, from 4.7 to 3.5 percent. In addition to the generally stagnant economic conditions, continuing high interest on large-scale borrowings contributed to the lower aerospace profit. Also affecting the industry's financial well-being was the shift in the commercial/government business mix, as the 1982 decline in civil aircraft manufacture coupled with a sharp rise in government sales, which usually generate lower earnings than commercial business.

Once again the aerospace industry can point with pride to its international trade performance—even though the export volume and trade balance dropped below the previous year's level. At a time when the nation as a whole was experiencing its worst-ever trade deficit, the aerospace industry recorded a substantial $15.6 billion export volume that offset to a considerable degree U.S. deficits in other areas of trade. The export figure was $2 billion less than 1981's record, but here again 1982 was the second best year for exports and trade balance, the latter a solid $11.2 billion, the best performance among U.S. manufacturing industries.

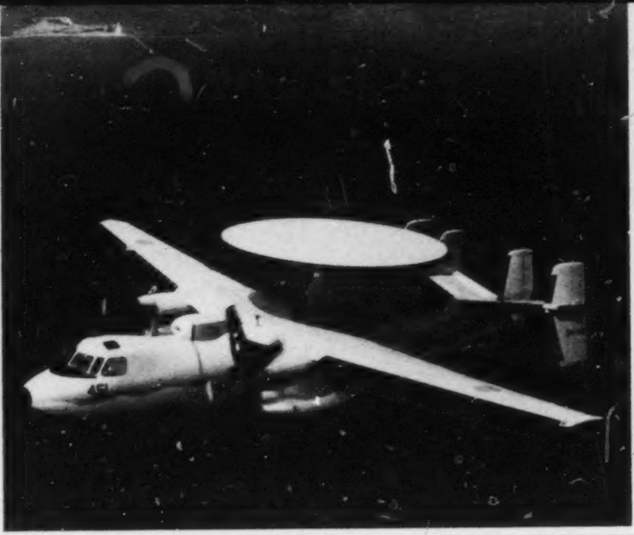
The backlog data suggest that 1983 will be similar to 1982; we expect that civil aircraft sales will continue to be depressed but will be offset by further increases in the defense and space workload.

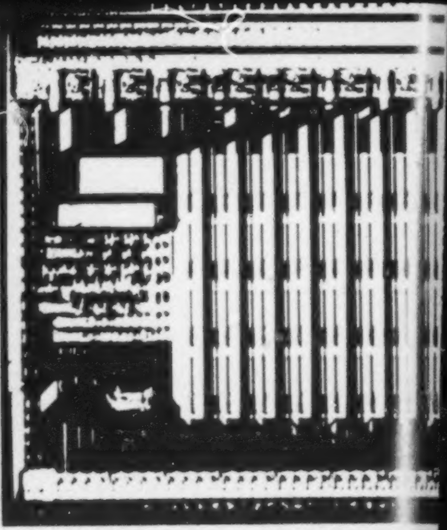
Predicting the aerospace future is, at any time, a chancy matter because industry activity is subject to so many variables. It is particularly imponderable today because of uncertainties in each of our primary areas of effort—defense, space and commercial aircraft.

At the moment of writing, it appears that the defense budget for Fiscal Year 1984 will be substantially lower than the Administration envisioned, raising the question of how the Administration's program will fare in future budgets. Projections indicate a large increase in space workload—but most of the increase is in military funding, so we come back to the matter of future defense budgets. Air transportation experts are predicting a 1983 return to profitability for the airlines, but their health must improve considerably before they can finance the large reequipment programs contemplated.

So, in assessing the future, we must assume that, however the Administration's defense buildup may be scaled down by Congressional action, there will be *some* military expansion in near future years, hence high levels of aerospace industry defense workload. Also, latest estimates indicate that a real activity boost in commercial aircraft production will probably come in the latter part of this decade. Thus, in sum, the aerospace industry today is healthy and vigorous, and well positioned for greater challenges in the future.

Karl G. Harr, Jr.
President
Aerospace Industries Association





AEROSPACE SUMMARY

In 1982, the aerospace industry recorded an increase in total sales, but it was an increase that failed to keep pace with the year's inflation. In inflation-adjusted constant dollars, the industry actually experienced a loss—a minute loss, only a small fraction of one percent, but it ended the upward sales trend in evidence since 1977. The statistical tables clearly show the reason: a sharp drop in sales of civil aircraft while the industry was experiencing substantial gains in all other aerospace sales.

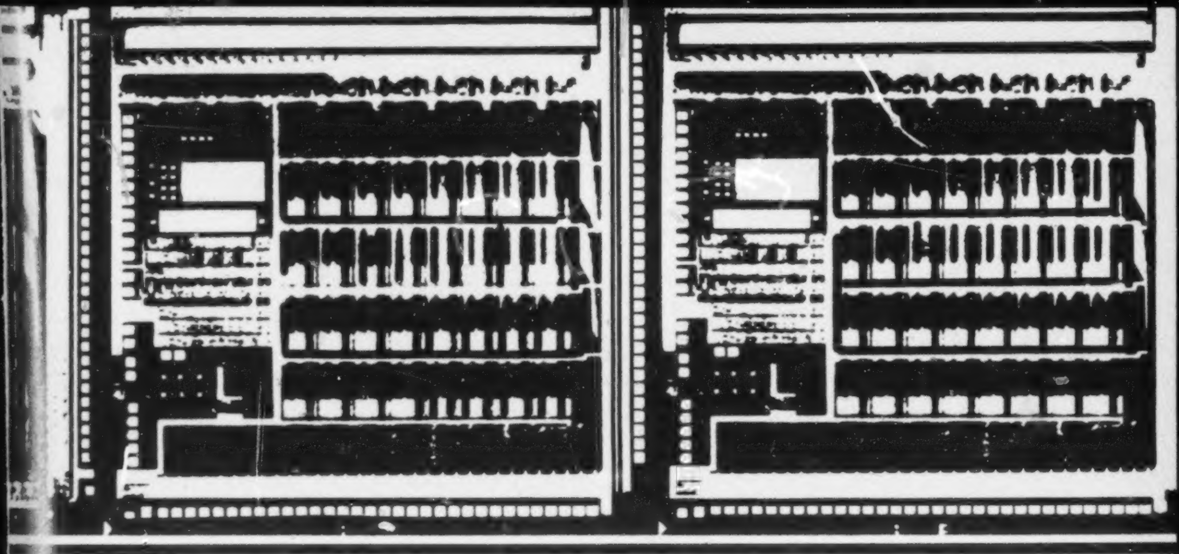
Here is a breakdown of the industry's 1982 performance:

Sales. Total sales amounted to $67 billion, up $3.7 billion in current dollars but down $20 million in constant dollars, essentially a zero growth year. There were sales increases in all product groups in current dollar terms, but in some cases—such as aircraft production and non-aerospace sales—the apparent gains were actually declines when adjusted for inflation. Sales of military aircraft (including engines and parts and related RDT&E) were up $5 billion over 1981, but civil aircraft sales were down $4.7 billion. The dollar value of the industry's space workload increased by $1.5 billion and there was a gain of $1.4 billion in missile sales.

Aerospace industry sales represented 2.2 percent of the Gross National Product (same as in 1981) and 3.6 percent of total sales by all U.S. manufacturing industries; the latter figure compares with 3.2 percent in 1981.

Profit. The industry's net profit after taxes was $2.2 billion, down from almost $3 billion in 1981. As a percentage of sales, the profit amounted to 3.2 percent, a big drop from 1981's 4.4 percent. The 1982 aerospace profit rate compares with an average of 3.5 percent for all U.S. manufacturing corporations.

Backlog. Despite a continuing lull in orders for civil aircraft, the aerospace backlog increased by $6.5 billion—seven percent—to $99.1 billion; converted to constant dollars, the backlog increased only $434



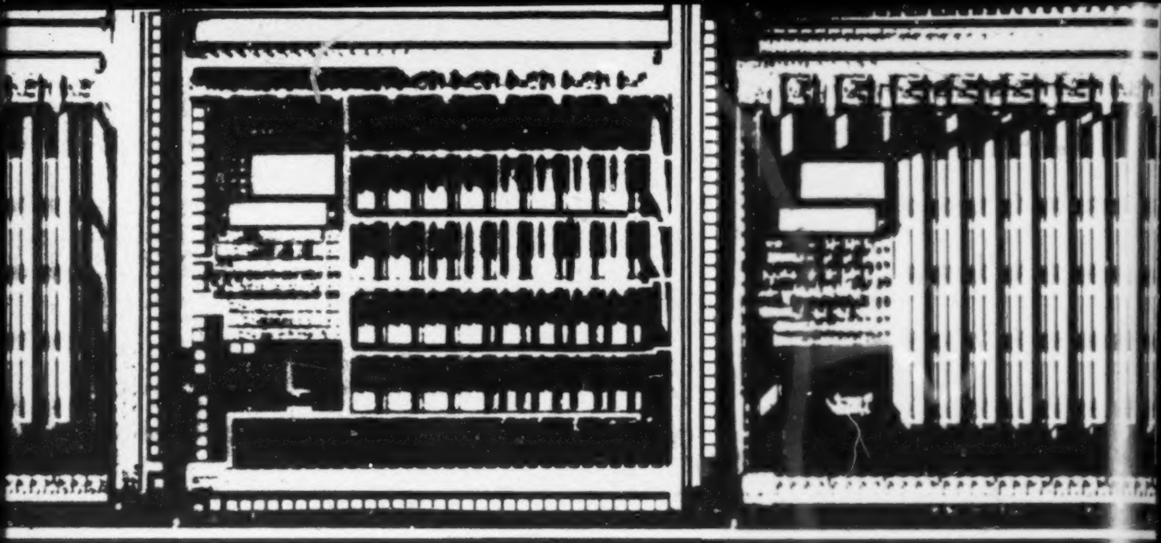
million over the year-end 1981 figure. The 1982 backlog was composed of $50.5 billion in orders from the U.S. government and $48.6 billion in work for other customers.

As is traditional, orders for aircraft—including engines and parts—constituted the principal element of the backlog, $59.5 billion or 60 percent of the total. The major backlog increases were in military aircraft orders from the government and in "other aerospace," a category that embraces conversions, modifications, ground support equipment and certain R&D contracts. The backlog for non-aerospace products and services increased in $1 billion and there were backlog declines in the civil aircraft and missiles/space categories.

Civil Aircraft Production. In 1982, the industry shipped 5,085 civil aircraft, fewer than half the number delivered in the previous year, marking the fourth straight year of decline in terms of numbers. In 1982 the dollar value also dropped, in contrast to the three prior years, in which total dollar value had increased despite fewer deliveries.

Value of civil aircraft deliveries in 1982 was $8.6 billion, down from $13.2 billion in the previous year. As is customary, the bulk of the dollar value was in sales of commercial transports, $6.2 billion; this category was also the area of greatest decline, down $3.5 billion from 1981. The industry delivered 232 transports, a figure that compares with 387 in the previous year. Backlog for commercial transports declined for the third consecutive year; at year-end 1982 it was $16.3 billion, compared with $17.2 billion in 1981. Units on order totaled 455, down from 526. Of particular note is the decline in orders from foreign customers, which formerly constituted more than half the total backlog; at year-end 1982 it was down to 45 percent of transport backlog value.

Civil helicopter production, which had been on the rise throughout the latter 1970s, continued to slip as shipments declined by almost 500 units to a 1982 total of 587. The dol-



lar value of sales was $365 million, down from $597 million in 1981.

Shipments of general aviation aircraft totaled 4,266, which compares with 9,457 in the previous year. The value of the shipments dropped by almost a third to a total of $2 billion.

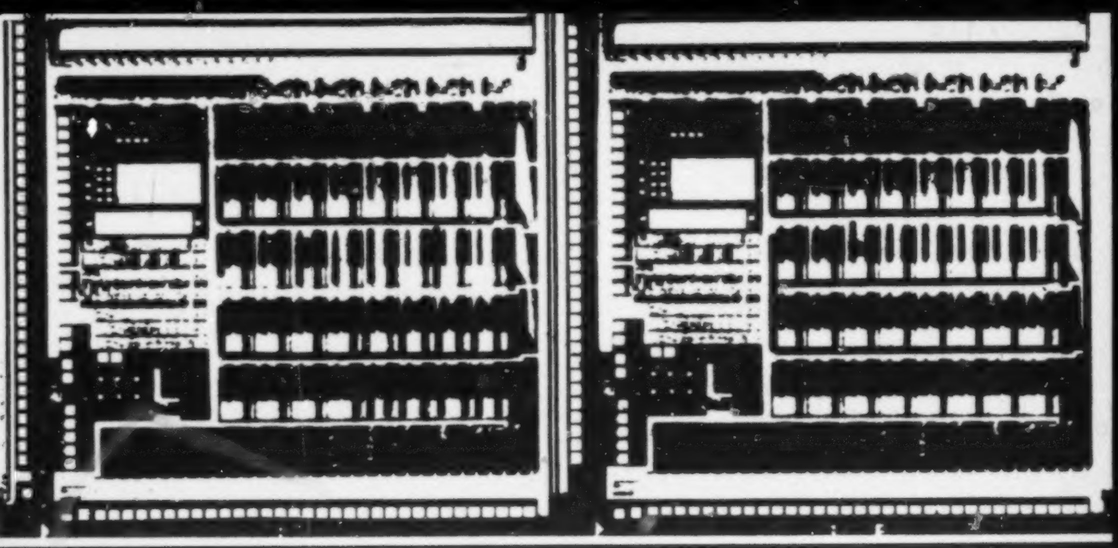
Military Aircraft Production. In terms of numbers, the industry produced 1,154 military aircraft; that compares with 1,062 in 1981. The 1982 total included 685 aircraft destined for use by the U.S. military services; the others were military aircraft sold to foreign customers on a commercial basis, or acceptances by the Department of Defense for delivery to foreign governments under Foreign Military Sales.

In Fiscal Year 1982, DoD outlays for aircraft procurement totaled $16.8 billion, compared with $13.2 billion in FY 1981; the estimate for FY 1983 is $21.4 billion and for FY 1984 $27.1 billion.

Missile Programs. Industry sales of missile systems, including production and R&D work, amounted to $8.3 billion in 1982; this represented an increase of $1.4 billion, or 20 percent, over 1981. Sales of missiles and parts, excluding R&D and propulsion systems, reached a record $5.4 billion, up from $4.7 billion in 1981. Backlog at year-end 1982 was $6.1 billion, down from $6.5 billion at the end of 1981.

Space Programs. Combined sales of civil and military space systems, including R&D, amounted to $11 billion in 1982, up 16 percent over 1981. The increase was due for the most part to rapidly growing military space activities, as indicated by federal budget authority figures. For Fiscal Year 1982, DoD's authorization ($6.4 billion) topped NASA's ($5.5 billion) for the first time since 1960. For FY 1983, DoD is authorized $8.5 billion, NASA $6.1 billion. For FY 1984, the Administration has requested $9.2 billion for DoD, $7.1 billion for NASA.

Non-aerospace Sales. In current dollars, sales of non-aerospace products and services by aerospace



manufacturers continued their 11-year climb and reached a new peak of $11.5 billion, up from $10.9 billion in 1981. In constant dollars, however, sales remained at almost exactly the previous year's level.

Research and Development. In 1982, funding for aerospace research and development increased slightly above the previous year's level. The total for 1982 was estimated at $12.2 billion, compounded of $9 billion in government funding and $3.2 billion in company funding; the total compares with $11.7 billion in 1981. Aerospace placed second among U.S. industries in the overall level of funding, behind the electrical machinery/communications equipment industry. Estimates for 1983 put aerospace R&D at $11.8 billion, $9.4 billion of it in government funding.

Foreign Trade. In a year when the United States experienced an all-time record international trade deficit, the aerospace industry recorded a strong trade performance that helped offset U.S. deficits in other areas. However, the levels of aerospace exports and trade balance fell below the previous year's. Exports totaled $15.6 billion, down from $17.6 billion in 1981, which was the record year. The 1982 total included $9.6 billion in civil exports (down $3.7 billion) and $6 billion in military exports, an all-time high. The aerospace trade balance was $11.2 billion, which compares with $13.1 billion in 1981.

Employment. Aerospace industry average employment for 1982 was 1,162,000, down about 3½ percent from 1981's 1,203,000. The drop was due largely to reduced activity in civil aircraft production, particularly commercial transports. Despite the reduction in the workforce, the industry's 1982 payroll was a record $33.8 billion; the average weekly paycheck was $461. Scientists and engineers employed in research and development in the aerospace industry numbered more than 95,000—accounting for almost nineteen percent of R&D scientists and engineers in all U.S. industries.

STANDARD INDUSTRIAL CLASSIFICATIONS APPLICABLE TO THE AEROSPACE INDUSTRY

3721		**AIRCRAFT**
	37211	Complete Aircraft, Military Type
	37212	Complete Aircraft, Personal & Utility Type
	37213	Complete Aircraft, Commercial Transport Type
	37214	Modifications, Conversions, Overhaul of Aircraft
	37216	Other Aeronautical Services on Aircraft
3724		**AIRCRAFT ENGINES AND ENGINE PARTS**
	37241	Aircraft Engines for U.S. Military Customers
	37242	Aircraft Engines for Other than U.S. Military
	37243	Aeronautical Services on Aircraft Engines
	37244	Aircraft Engine Parts and Accessories
3728		**AIRCRAFT PARTS AND AUXILIARY EQUIPMENT, NEC**
	37281	Aircraft Parts & Accessories, NEC
	37283	Research and Development on Aircraft Parts
	37285	Aircraft Propellers and Parts
3761		**GUIDED MISSILES AND SPACE VEHICLES**
	37611	Missile Systems, Excluding Propulsion
	37612	Space Vehicle Systems, Excluding Propulsion
	37613	Research & Development on Complete Missiles
	37614	Research & Development on Complete Space Vehicles
	37615	All Other Services on Complete Missiles & Space Vehicles
3764		**SPACE PROPULSION UNITS AND PARTS**
	37645	Complete Missile or Space Vehicle Engines and/or Propulsion Units
	37646	Research and Development on Complete Missile or Space Vehicle Engines and/or Propulsion Units
	37647	All Other Services on Complete Missile or Space Vehicle Engines and/or Propulsion Units
	37648	Missile and Space Vehicle Engine and/or Propulsion Unit Parts and Accessories
3769		**SPACE VEHICLE EQUIPMENT, NEC**
	37692	Missiles & Space Vehicle Parts & Subassemblies, NEC
	37694	Research & Development on Missile & Space Vehicle Parts & Components, NEC
3662		**RADIO AND TELEVISION COMMUNICATIONS EQUIPMENT**
	36624	Electronic Navigational Aids (Except Space Vehicle-Borne)
	36625	Electronic Search & Detection Apparatus, Radar, Infrared, Sonar, Etc.
	36626	Electronic Military, Industrial & Communications Equipment, NEC
	36627	Space Satellite-Borne Communications Systems (Complete Package)
	36628	Missile-Borne Navigational Guidance Systems & Equipment
38		**INSTRUMENTS**
	38111	Aeronautical, Nautical & Navigational Instruments & Automatic Pilots
	38291	Aircraft Engines Instruments, Except Flight

Source: U.S. Government Office of Management and Budget, *Standard Industrial Classification Manual, 1972* (incorporating revisions from the 1977 Supplement).

NOTE: The Standard Industrial Classification (SIC) is a system developed by the U.S. Government to define the industrial composition of the economy, facilitating comparability of statistics. It is revised periodically to reflect the changing industrial composition of the economy.

NEC: Not elsewhere classified.

AEROSPACE INDUSTRY SALES BY CUSTOMER

Calendar Years 1968-1982
(Millions of Dollars)

Year	TOTAL SALES	Aerospace Products and Services				Non-Aerospace[a]	
		Total	U.S. Government		Other Customers[b]	U.S. Gov't	Other Customers
			Dept. of Defense	NASA and Other Agencies			
CURRENT DOLLARS							
1968	$25,927	$23,378	$13,609	$3,978	$ 5,791	$1,568	$ 981
1969	25,278	22,579	13,832	3,369	5,378	1,633	1,066
1970	24,924	22,280	14,011	3,000	5,269	1,465	1,179
1971	22,064	19,541	11,877	2,779	4,885	1,372	1,151
1972	21,512	18,866	11,195	2,649	5,022	1,546	1,100
1973	24,744	21,401	11,846	2,459	7,096	1,925	1,418
1974	27,145	23,078	12,329	2,608	8,141	2,060	2,007
1975	30,356	25,564	13,795	2,838	8,931	2,496	2,296
1976	31,528	26,217	15,106	2,938	8,173	2,879	2,432
1977	33,854	27,750	16,023	3,012	8,715	3,625	2,479
1978	38,939	32,126	16,770	3,151	12,205	3,860	2,953
1979	44,210	36,495	17,708	3,453	15,334	4,087	3,628
1980	52,896	44,077	20,994	4,106	18,997	4,762	4,057
1981[r]	63,211	52,327	26,490	4,700	21,137	5,986	4,898
1982	66,958	55,429	32,225	4,863	18,341	6,341	5,188
CONSTANT DOLLARS (1972 = 100)[c]							
1968	$31,411	$28,323	$16,488	$4,819	$ 7,016	$1,900	$1,189
1969	29,125	26,016	15,937	3,882	6,197	1,882	1,228
1970	27,254	24,363	15,321	3,280	5,762	1,602	1,289
1971	22,981	20,353	12,371	2,894	5,088	1,429	1,199
1972	21,512	18,866	11,195	2,649	5,022	1,546	1,100
1973[r]	23,399	20,237	11,202	2,325	6,710	1,820	1,341
1974[r]	23,588	20,054	10,713	2,266	7,074	1,790	1,744
1975[r]	24,132	20,323	10,967	2,256	7,100	1,984	1,825
1976[r]	23,823	19,810	11,415	2,220	6,176	2,175	1,838
1977[r]	24,173	19,814	11,441	2,151	6,223	2,588	1,770
1978[r]	25,887	21,358	11,149	2,095	8,114	2,566	1,963
1979[r]	27,053	22,332	10,836	2,113	9,383	2,501	2,220
1980[r]	29,610	24,674	11,752	2,298	10,623	2,666	2,271
1981[r]	32,331	26,764	13,549	2,404	10,811	3,062	2,505
1982	32,311	26,748	15,550	2,347	8,851	3,060	2,503

Source: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Sales." A comprehensive revision of the AIA aerospace industry sales series for 1967-1980 was completed in 1982 in order to incorporate different data sources selected to better reflect the evolving composition of the aerospace industry.

[a] Products and services other than aircraft, missiles, and space vehicles and parts, produced by establishments whose principal business is the development and/or manufacture of aerospace products.

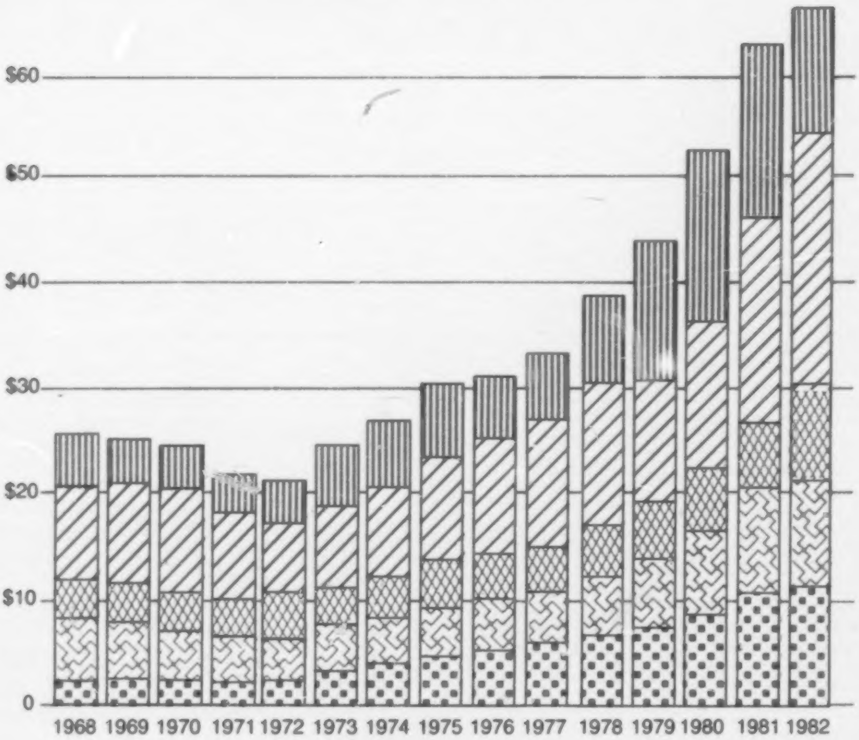
[b] All civil sales of aircraft (domestic and export), commercial space sales, and all military aircraft and missile exports, including both commercial (manufacturer-to-foreign government) and Foreign Military Sales (FMS).

[c] Based on GNP implicit price deflator. Detail may not add to totals because of rounding.

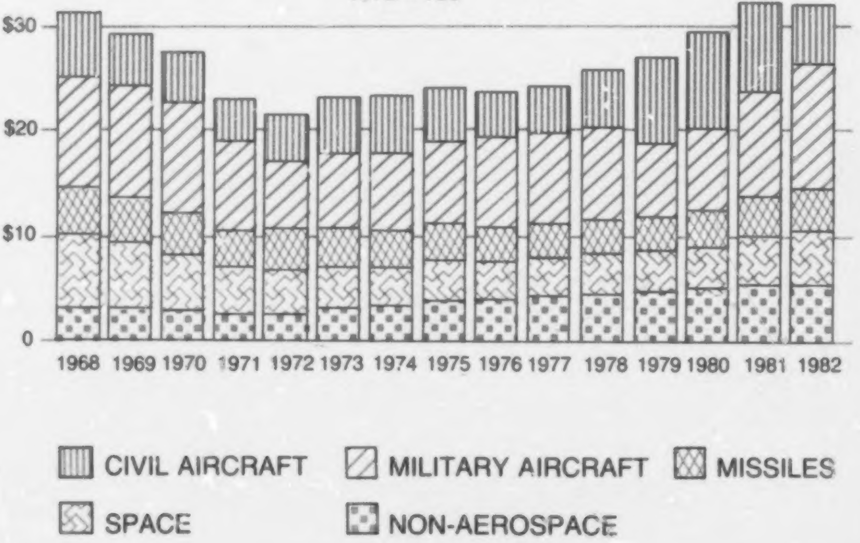
[r] Revised.

AEROSPACE INDUSTRY SALES BY PRODUCT GROUP

(Billions of Current Dollars)



(Billions of Constant Dollars)
1972 = 100



Source: Aerospace Industries Association

AEROSPACE INDUSTRY SALES BY PRODUCT GROUP

Calendar Years 1968-1982
(Millions of Dollars)

Year	TOTAL SALES	Aircraft			Missiles	Space	Non-Aerospace[a]
		Total	Civil	Military			
CURRENT DOLLARS							
1968	$25,927	$13,756	$ 5,025	$ 8,731	$ 3,651	$ 5,971	$ 2,549
1969	25,278	13,660	4,267	9,393	3,624	5,295	2,699
1970	24,924	13,899	4,382	9,517	3,656	4,725	2,644
1971	22,064	11,897	3,764	8,133	3,283	4,361	2,523
1972	21,512	10,750	4,181	6,569	3,953	4,163	2,646
1973	24,744	13,376	5,742	7,634	3,899	4,126	3,343
1974	27,145	14,761	6,320	8,441	3,905	4,412	4,067
1975	30,356	16,350	6,463	9,887	4,528	4,686	4,792
1976	31,528	16,988	6,007	10,981	4,442	4,787	5,311
1977	33,854	18,312	6,183	12,129	4,437	5,001	6,104
1978	38,939	21,617	8,222	13,395	4,792	5,717	6,813
1979	44,210	24,659	13,227	11,432	5,291	6,545	7,715
1980	52,896	30,144	16,285	13,859	6,041	7,892	8,819
1981[r]	63,211	35,898	16,427	19,471	6,965	9,464	10,884
1982	66,958	36,116	11,684	24,432	8,334	10,979	11,529
CONSTANT DOLLARS (1972 = 100)[b]							
1968	$31,411	$16,666	$ 6,088	$10,578	$ 4,423	$ 7,234	$ 3,088
1969	29,125	15,739	4,916	10,823	4,176	6,101	3,110
1970	27,254	15,198	4,792	10,407	3,998	5,167	2,891
1971	22,981	12,391	3,920	8,471	3,419	4,542	2,628
1972	21,512	10,750	4,181	6,569	3,953	4,163	2,646
1973[r]	23,399	12,649	5,430	7,219	3,687	3,902	3,161
1974[r]	23,588	12,827	5,492	7,335	3,393	3,834	3,534
1975[r]	24,132	12,998	5,138	7,860	3,600	3,725	3,810
1976[r]	23,823	12,837	4,539	8,298	3,357	3,617	4,013
1977[r]	24,173	13,075	4,415	8,660	3,168	3,571	4,358
1978[r]	25,887	14,371	5,466	8,905	3,186	3,801	4,529
1979[r]	27,053	15,089	8,094	6,995	3,238	4,005	4,721
1980[r]	29,610	16,874	9,116	7,758	3,382	4,418	4,937
1981[r]	32,331	18,361	8,402	9,959	3,562	4,841	5,567
1982	32,311	17,428	5,638	11,790	4,022	5,298	5,563

Source: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Sales." A comprehensive revision of the AIA aerospace industry sales series for 1967-1980 was completed in 1982 in order to incorporate different data sources selected to better reflect the evolving composition of the aerospace industry.

[a] Products and services other than aircraft, missiles, and space vehicles and parts, produced by establishments whose principal business is the development and/or manufacture of aerospace products.

[b] Based on GNP implicit price deflator. Detail may not add to totals because of rounding.

[r] Revised.

SALES OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

Calendar Years 1968-1982
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, and Parts		Missiles & Space Incl. Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't.	Other	U.S. Gov't.	Other		U.S. Gov't.	Other	
CURRENT DOLLARS									
1968	$25,592	$16,635	$ 8,957	$ 7,411	$ 6,439	$ 6,076	$ 2,077	$1,040	$ 2,549
1969	24,648	16,560	8,088	7,161	5,603	5,660	2,539	986	2,699
1970	24,752	16,407	8,345	7,586	5,880	5,422	2,324	896	2,644
1971	21,679	14,114	7,565	6,313	5,079	4,971	1,909	884	2,523
1972	21,499	13,492	8,007	4,954	5,199	5,598	2,067	1,035	2,646
1973	24,305	14,431	9,874	5,539	6,739	5,580	2,103	1,001	3,343
1974	26,849	15,196	11,653	5,982	7,560	5,854	2,101	1,285	4,067
1975	29,473	17,314	12,159	6,859	7,797	6,310	2,070	1,645	4,792
1976	31,328	19,083	12,245	8,314	7,622	5,880	2,368	1,833	5,311
1977	33,315	20,704	12,611	8,848	7,530	5,775	2,839	2,219	6,104
1978	37,968	21,888	16,080	8,724	10,581	6,380[a]	3,363	2,107[a]	6,813
1979	46,173	23,229	22,944	8,649	16,023	7,197	3,930	2,659	7,715
1980	58,440	26,674	31,766	9,427	20,097	8,393	6,869	2,609	11,045
1981[r]	69,944	33,039	36,905	12,047	21,527	9,722	8,155	3,384	15,109
1982	73,953	41,381	32,572	15,283	17,338	11,827	10,124	3,815	15,566
CONSTANT DOLLARS (1972 = 100)[b]									
1968	$31,006	$20,154	$10,852	$ 8,979	$ 7,801	$ 7,361	$ 2,516	$1,260	$ 3,088
1969	28,400	19,081	9,319	8,251	6,456	6,521	2,925	1,136	3,110
1970	27,066	17,941	9,125	8,295	6,430	5,929	2,541	980	2,891
1971	22,580	14,701	7,879	6,575	5,290	5,178	1,988	921	2,628
1972	21,499	13,492	8,007	4,954	5,199	5,598	2,067	1,035	2,646
1973[r]	22,983	13,646	9,337	5,238	6,372	5,277	1,989	946	3,161
1974[r]	23,331	13,205	10,126	5,198	6,569	5,087	1,826	1,117	3,534
1975[r]	23,430	13,764	9,666	5,453	6,198	5,016	1,646	1,308	3,809
1976[r]	23,672	14,420	9,253	6,282	5,759	4,443	1,789	1,385	4,013
1977[r]	23,788	14,783	9,005	6,318	5,377	4,124	2,027	1,584	4,358
1978[r]	25,241	14,551	10,690	5,800	7,034	4,241	2,236	1,401	4,529
1979[r]	28,254	14,214	14,040	5,292	9,805	4,404	2,405	1,627	4,721
1980[r]	32,714	14,932	17,782	5,277	11,250	4,698	3,845	1,460	6,183
1981[r]	35,775	16,899	18,876	6,162	11,011	4,973	4,171	1,731	7,728
1982	35,686	19,969	15,718	7,375	8,367	5,707	4,885	1,841	7,511

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] AIA estimate based on MQ37D data.

[b] Based on GNP implicit price deflator; detail may not add to totals because of rounding.

[r] Revised.

BACKLOG OF MAJOR AEROSPACE COMPANIES AS REPORTED BY THE BUREAU OF THE CENSUS

As of December 31, 1968-1982
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft, Engines, and Parts		Missiles & Space Incl. Propulsion	Other Aerospace		Non-Aerospace
		U.S. Gov't.	Other	U.S. Gov't.	Other		U.S. Gov't.	Other	
CURRENT DOLLARS									
1968	$30,749	$16,343	$14,406	$ 8,150	$12,409	$ 5,083	$ 1,851	$ 983	$ 2,273
1969	28,297	14,298	13,999	7,089	12,099	4,338	2,001	880	1,890
1970	24,705	12,882	11,823	5,913	9,800	4,522	1,986	805	1,679
1971	24,579	13,997	10,582	6,221	8,059	4,780	2,232	1,042	2,245
1972	26,922	15,322	11,600	7,027	8,605	5,272	2,018	972	3,028
1973	29,661	16,695	12,966	7,815	8,550	5,670	1,819	1,078	4,729
1974	35,516	20,889	14,627	9,789	9,602	6,643	1,926	1,665	5,891
1975	35,038	22,168	12,870	10,751	8,141	6,415	1,983	2,088	5,660
1976	39,702	24,141	15,561	11,950	8,929	6,286	2,046	3,496	6,995
1977	45,309	26,119	19,190	12,471	12,592	6,743	2,761	3,447	7,295
1978	57,160	30,223	26,937	14,897	18,972	7,557	4,029	3,668	8,037
1979[a]	78,259	36,136	42,123	17,316	33,168	7,388	5,613	5,112	9,662
1980[r]	89,732	37,199	52,533	17,435	39,800	8,941	8,421	5,127	10,008
1981[r]	92,640	43,262	49,378	21,384	36,344	11,047	8,977	4,979	9,909
1982	99,094	50,465	48,629	25,197	34,300	10,934	11,685	6,046	10,932
CONSTANT DOLLARS (1972 = 100)[b]									
1968	$37,253	$19,800	$17,453	$ 9,874	$15,034	$ 6,158	$ 2,243	$1,191	$ 2,754
1969	32,604	16,474	16,130	8,168	13,941	4,998	2,306	1,014	2,178
1970	27,015	14,086	12,928	6,466	10,716	4,945	2,172	880	1,836
1971	25,600	14,579	11,022	6,480	8,394	4,979	2,325	1,085	2,338
1972	26,922	15,322	11,600	7,027	8,605	5,272	2,018	972	3,028
1973[r]	28,048	15,787	12,261	7,390	8,085	5,362	1,720	1,019	4,472
1974[r]	30,862	18,152	12,710	8,506	8,344	5,773	1,674	1,447	5,119
1975[r]	27,854	17,623	10,231	8,547	6,472	5,100	1,576	1,660	4,500
1976[r]	30,000	18,242	11,758	9,030	6,747	4,750	1,546	2,642	5,286
1977[r]	32,352	18,650	13,702	8,905	8,991	4,815	1,971	2,461	5,209
1978[r]	38,000	20,092	17,908	9,904	12,613	5,024	2,679	2,439	5,343
1979[r]	47,888	22,112	25,776	10,596	20,296	4,521	3,435	3,128	5,912
1980[r]	50,231	20,823	29,407	9,760	22,279	5,005	4,714	2,870	5,602
1981[r]	47,384	22,128	25,256	10,938	18,589	5,650	4,592	2,547	5,068
1982	47,818	24,352	23,466	12,159	16,552	5,276	5,639	2,918	5,275

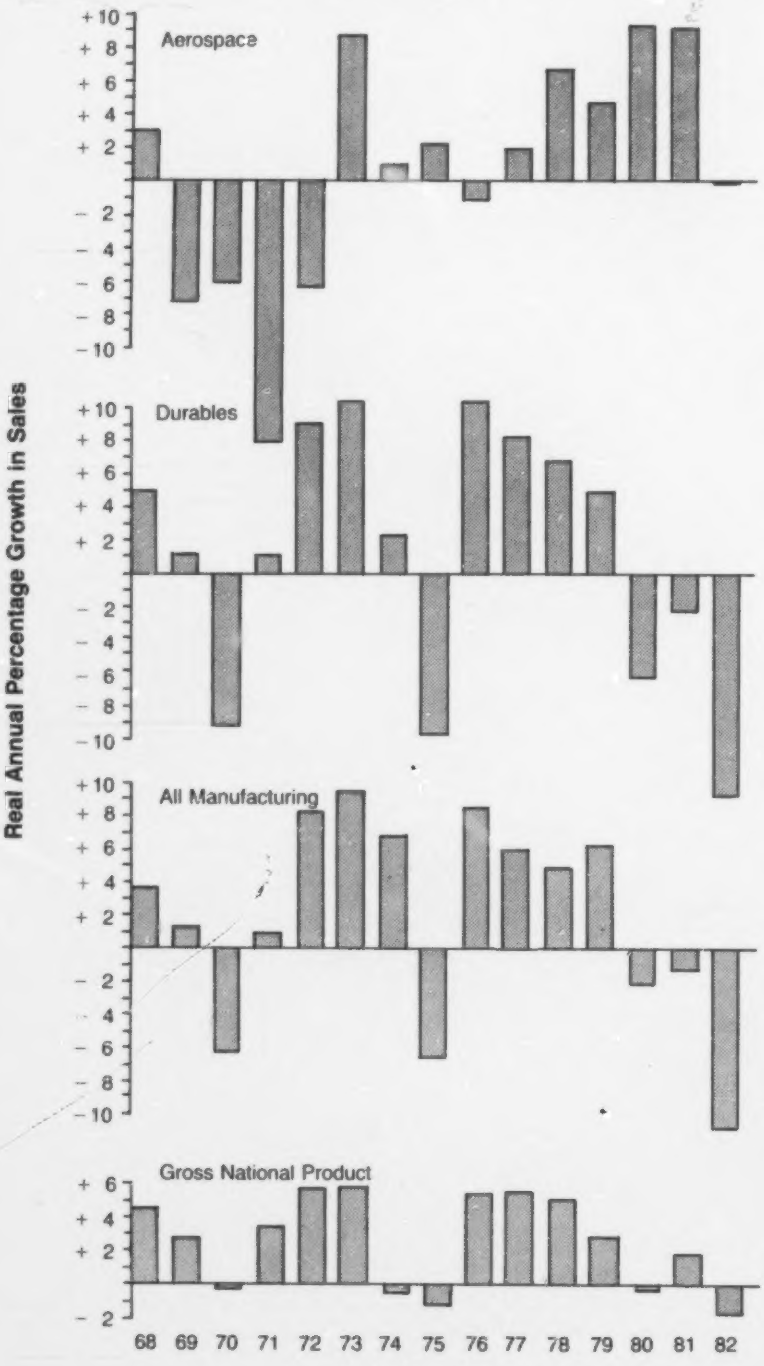
Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] The backlog total has been revised to $78,548 million, but product group detail is not available.

[b] Based on GNP implicit price deflator; detail may not add to totals because of rounding.

[r] Revised.

AEROSPACE SALES AND THE NATIONAL ECONOMY



Source: Aerospace Industries Association

AEROSPACE SALES AND THE NATIONAL ECONOMY

Calendar Years 1970-1982
(Billions of Dollars)

Year	Gross National Product	Industry Sales			Aerospace Sales As Percent of		
		Manufacturing	Durable Goods	Aerospace[a]	GNP	Manufacturing	Durable Goods
CURRENT DOLLARS							
1970	$ 992.7	$ 633.7	$ 338.6	$ 24.9	2.5%	3.9%	7.4%
1971	1,077.6	671.1	359.7	22.1	2.1	3.3	6.1
1972	1,185.9	756.5	408.5	21.5	1.8	2.8	5.3
1973	1,326.4	875.4	476.4	24.7	1.9	2.8	5.2
1974	1,434.2	1,017.9	531.0	27.1	1.9	2.7	5.1
1975	1,549.2	1,039.4	524.1	30.4	2.0	2.9	5.8
1976	1,718.0	1,185.7	608.4	31.5	1.8	2.7	5.2
1977	1,918.0	1,330.1	696.1	33.9	1.8	2.5	4.9
1978	2,163.9[r]	1,496.6	798.1	38.9	1.8	2.6	4.9
1979	2,417.8[r]	1,727.3	909.6	44.2	1.8	2.6	4.9
1980	2,633.1[r]	1,845.9	936.0	52.9	2.0	2.9	5.7
1981	2,937.7[r]	1,994.6[r]	1,001.0[r]	63.2[r]	2.2	3.2	6.3
1982	3,059.3	1,886.0	918.2	67.0	2.2	3.6	7.3

Year	Gross National Product	Manufacturing	Durable Goods	Aerospace	Real Annual Growth[c]			
CONSTANT DOLLARS (1972 = 100)[b]					GNP	Mfg.	Durs.	Aero.
1970	$1,085.6	$ 692.9	$ 370.3	$ 27.3	(0.2)%	(6.4)%	(9.1)%	(6.2)%
1971	1,122.4	699.0	374.6	23.0	3.4	0.9	1.2	(15.8)
1972	1,185.9	756.5	408.5	21.5	5.7	8.2	9.0	(6.5)
1973[r]	1,254.3	827.8	450.5	23.4	5.8	9.4	10.3	8.8
1974[r]	1,246.3	884.5	461.4	23.6	(0.6)	6.8	2.4	0.9
1975[r]	1,231.6	826.3	416.6	24.1	(1.2)	(6.6)	(9.7)	2.1
1976[r]	1,298.2	895.9	459.7	23.8	5.4	8.4	10.3	(1.2)
1977[r]	1,369.7	949.7	497.0	24.2	5.5	6.0	8.1	1.7
1978[r]	1,438.6	994.9	530.6	25.9	5.0	4.8	6.8	6.6
1979[r]	1,479.4	1,057.0	556.6	27.1	2.8	6.2	4.9	4.6
1980[r]	1,474.0	1,033.3	524.0	29.6	(0.4)	(2.2)	(6.2)	9.2
1981[r]	1,502.6	1,020.2	512.0	32.3	1.9	(1.3)	(2.3)	9.1
1982	1,476.3	910.1	443.1	32.3	(1.8)	(10.8)	(13.5)	(0.1)

Source: Gross National Product and GNP Implict Price Deflator: "Economic Report of the President" (Annually) and "Survey of Current Business" (Monthly). Sales of Manufacturing and Durable Goods Industries: "Survey of Current Business" (Monthly). Aerospace Sales: Aerospace Industries Association.

NOTE: See Glossary for explanation of "Aerospace Sales."

[a] A comprehensive revision of the AIA aerospace industry sales series for 1967-1980 was completed in 1982 in order to incorporate different data sources selected to better reflect the evolving composition of the aerospace industry.

[b] Based on GNP implicit price deflator.

[c] Parentheses indicate negative real annual growth.

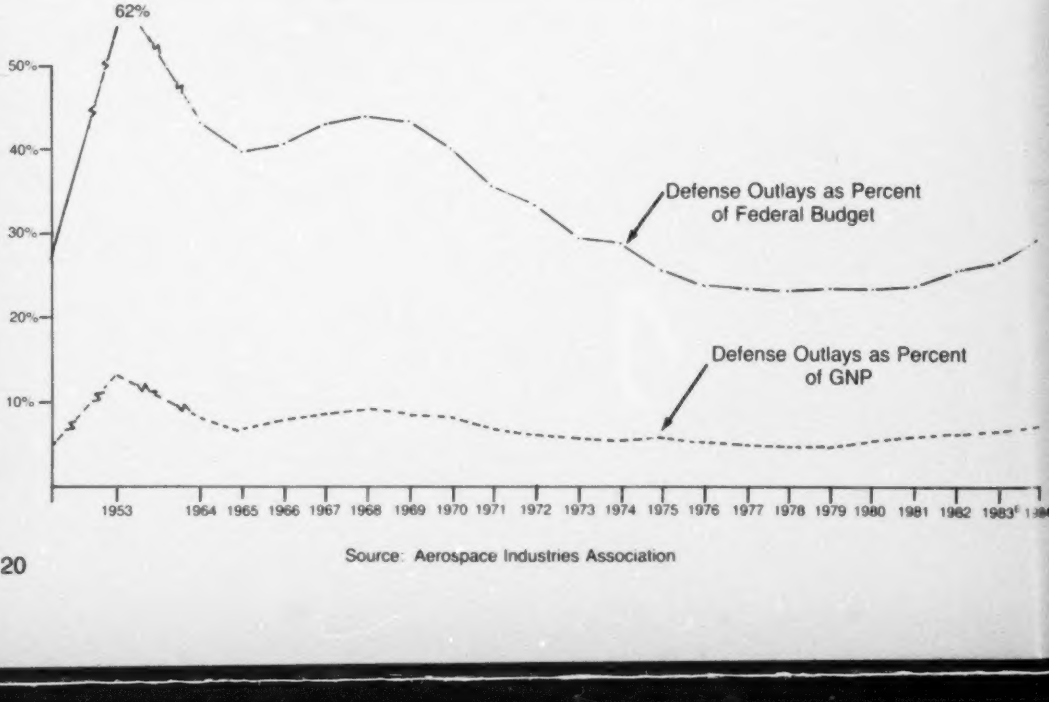
[r] Revised.

GROSS NATIONAL PRODUCT, FEDERAL BUDGET AND DEFENSE BUDGET

Selected Fiscal Years
(Billions of Dollars)

Fiscal Year	GNP	Federal Budget Outlays			Defense Outlays as Percent of	
		NET TOTAL[b]	Defense	Others	GNP	Federal Budget
1950—Lowest defense budget since World War II peak	$ 261.1	$ 43.1	$ 12.0	$ 31.1	4.6%	27.8%
1953—Korea Peak	361.3	76.8	47.5	29.3	13.1	61.8
1964—Last prewar year	618.2	118.6	51.5	67.1	8.3	43.4
1968—South East Asia peak	831.3	178.1	78.8	99.3	9.5	44.2
1973—Actual	1,252.0	245.6	74.5	171.1	6.0	30.3
1974—Actual	1,379.4	267.9	77.8	190.1	5.6	29.0
1975—Actual	1,479.9	324.2	85.6	238.6	5.8	26.4
1976—Actual	1,640.1	364.5	89.4	275.1	5.5	24.5
1977—Actual	1,862.8[r]	400.5	97.5	303.0	5.2	24.3
1978—Actual	2,091.3[r]	448.4	105.2	343.2	5.0	23.5
1979—Actual	2,357.7[r]	491.0	117.7	373.3	5.0	24.0
1980—Actual	2,573.9[r]	576.7	135.9	440.8	5.3	23.6
1981—Actual	2,871.8[r]	657.2	159.8	497.4	5.6	24.3
1982—Actual	3,033.0	728.4	187.4	541.0	6.2	25.7
1983—Estimate	3,193.7	805.2	214.8	590.4	6.7	26.7
1984—Estimate	3,488.7	848.5	245.3	603.2	7.0	28.9

Source: "The Budget of the united States Government" (Annually).
[a] "Defense" includes the military budget of DOD and other defense-related activities.
[b] "Net Total" is government-wide total less intragovernmental transactions; excludes off-budget entities.
[r] Revised.



Source: Aerospace Industries Association

FEDERAL OUTLAYS
DEFENSE, NASA AND AEROSPACE PRODUCTS AND SERVICES

Fiscal Years 1960-1984
(Millions of Dollars)

Year	TOTAL National Defense	TOTAL NASA	Federal Outlays for Aerospace Products & Services			Aerospace as Percent of Total National Defense and NASA
			TOTAL	DOD[a]	NASA	
1960	$ 45,691	$ 401	$12,849	$12,502	$ 347	27.9%
1961	47,494	744	13,606	12,960	646	28.2
1962	51,103	1,257	15,135	13,992	1,143	28.9
1963	52,755	2,552	16,186	13,857	2,327	29.3
1964	53,591	4,171	17,938	14,205	3,733	31.1
1965	49,578	5,093	15,697	11,135	4,561	28.7
1966	56,785	5,933	17,771	12,411	5,360	28.3
1967	70,081	5,426	20,011	14,874	5,137	26.5
1968	80,517	4,724	21,355	16,757	4,598	25.1
1969	81,232	4,251	20,472	16,286	4,185	23.9
1970	80,295	3,753	18,747	15,048	3,699	22.3
1971	77,661	3,382	17,335	13,997	3,338	21.4
1972	78,336	3,422	16,999	13,627	3,372	20.8
1973	74,571	3,315	15,945	12,675	3,270	20.5
1974	77,781	3,256	15,782	12,601	3,181	19.5
1975	85,552	3,266	15,943	12,762	3,181	18.0
1976	89,430	3,669	16,843	13,295	3,548	18.1
Tr. Qtr.	22,307	952	3,944	3,018	926	17.0
1977	97,501	3,945	18,201	14,361	3,840	17.9
1978	105,186	3,983	12,624	8,765	3,859	11.6
1979	117,681	4,196	14,984	10,920	4,064	12.3
1980	135,856	4,852	18,297	13,585	4,712	13.0
1981	159,765	5,426	21,984	16,706	5,278	13.3
1982	187,418	6,035	27,057	21,131	5,926	14.0
1983[E]	214,769	6,722	33,815	27,230	6,585	15.3
1984[E]	245,305	6,981	41,346	34,493	6,853	16.4

Source: "The Budget of the United States Government" (Annually).

NOTE: "National Defense" includes the military budget of the Department of Defense and other defense-related activities. "Total NASA" includes research and development activities, administrative operations and construction of facilities. NASA construction is not included in "Total Aerospace Products and Service."

[a] Prior to 1978, DOD outlays for aircraft and missile procurement and RTD&E. Effective 1978, includes only procurement; outlays for RDT&E by product group not available.

[E] Estimate.

FEDERAL OUTLAYS FOR AEROSPACE PRODUCTS AND SERVICES

Fiscal Years 1960-1984
(Millions of Dollars)

Year	TOTAL	Department of Defense[a]			NASA[b]
		TOTAL	Aircraft	Missiles[c]	
1960	$12,849	$12,502	$ 7,416	$5,086	$ 347
1961	13,606	12,960	6,963	5,997	646
1962	15,135	13,992	7,773	6,219	1,143
1963	16,186	13,857	7,799	6,058	2,327
1964	17,938	14,205	8,276	5,929	3,733
1965	15,697	11,135	7,138	3,997	4,562
1966	17,771	12,411	8,541	3,870	5,360
1967	20,011	14,874	10,442	4,432	5,137
1968	21,355	16,757	12,016	4,741	4,598
1969	20,472	16,286	11,367	4,919	4,185
1970	18,747	15,048	9,940	5,108	3,699
1971	17,335	13,997	8,849	5,148	3,338
1972	16,999	13,627	8,461	5,166	3,372
1973	15,945	12,675	7,614	5,061	3,270
1974	15,782	12,601	7,460	5,141	3,181
1975	15,943	12,762	7,697	5,065	3,181
1976	16,843	13,295	8,704	4,591	3,548
Tr. Qtr.	3,944	3,018	2,096	922	926
1977	18,201	14,361	9,321	5,040	3,840
1978	12,624	8,765	6,971	1,794	3,859
1979	14,984	10,920	8,836	2,084	4,064
1980	18,297	13,585	11,124	2,461	4,712
1981	21,984	16,706	13,193	3,513	5,278
1982	27,057	21,131	16,793	4,338	5,926
1983[E]	33,815	27,230	21,435	5,795	6,585
1984[E]	41,346	34,493	27,066	7,427	6,853

Source: Department of Defense Budget (Annually); NASA Budget (Annually).

[a] Prior to 1978, DOD outlays for aircraft and missile procurement and RDT&E. Effective 1978, includes only procurement; outlays for RDT&E by product group no longer available.

[b] Includes Research & Development, and Research & Program Management; excludes Construction of Facilities.

[c] Effective 1978, for Army and Air Force only; Navy missile procurement outlays data no longer available as separate budget item.

[E] Estimate.

DEPARTMENT OF DEFENSE AEROSPACE OUTLAYS

Fiscal Years 1960-1984 (Millions of Dollars)

Year	DOD Aerospace Outlays[a]		
	TOTAL	Procurement	Research Development, Test and Evaluation
1960	$12,502	$ 9,299	$ 3,203
1961	12,960	8,870	4,090
1962	13,992	9,842	4,150
1963	13,857	10,126	3,731
1964	14,205	9,630	4,575
1965	11,135	7,296	3,839
1966	12,411	8,704	3,707
1967	14,875	10,341	4,534
1968	16,757	11,681	5,076
1969	16,286	11,686	4,600
1970	15,048	10,860	4,188
1971	13,997	9,771	4,226
1972	13,627	8,936	4,691
1973	12,675	8,089	4,586
1974	12,601	7,987	4,614
1975	12,762	8,373	4,389
1976	13,295	8,816	4,479
Tr. Qtr.	3,018	1,959	1,059
1977	14,361	9,389	4,972
1978	NA	8,765	NA
1979	NA	10,920	NA
1980	NA	13,585	NA
1981	NA	16,706	NA
1982	NA	21,131	NA
1983[E]	NA	27,230	NA
1984[E]	NA	34,493	NA

Source: Department of Defense Budget (Annually).
[a] Excludes Military Assistance.
[E] Estimate.
NA Not Available.

DEPARTMENT OF DEFENSE
TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE[a]

Fiscal Years 1976-1984
(Millions of Dollars)

	1976	Transition Quarter	1977
TOTAL	$88,036	$21,927	$95,650
PROCUREMENT—TOTAL	15,964	3,766	18,178
AIRCRAFT	6,520	1,557	6,608
MISSILES	2,296	402	2,781
Ships	2,606	661	2,841
Combat Vehicles, Weapons & Torpedoes	240	134	833
Ordnance, Vehicles & Related Equipment	856	150	940
Electronics & Communications	1,031	271	1,197
Other Procurement	2,415	591	2,978
RESEARCH, DEVELOPMENT, TEST & EVALUATION—TOTAL	8,923	2,206	9,795
AIRCRAFT	1,603	410	2,176
MISSILES	2,295	520	2,259
ASTRONAUTICS	581	129	537
Other	4,444	1,147	4,823
Military Personnel—TOTAL	32,359	8,305	33,931
Active Forces	23,259	5,846	23,857
Reserve Forces	1,804	512	1,858
Retired Pay	7,296	1,947	8,216
Military Construction	2,019	376	1,914
Family Housing	1,192	296	1,358
Civil Defense	80	18	93
Operations and Maintenance	27,902	7,261	30,587
Other	(403)	(301)	(206)

Source: Department of Defenses Budget (Annually).

NOTE: Data in parentheses are credit items. The categories printed in capital letters are primarily aerospace, but others contain substantial parts attributable to aerospace activities. Detail may not add to totals because of rounding.

[a] Includes all items in the DOD military budget; excludes the DOD civil budget for the Army Corps of Engineers and other non-defense-related activities.

[b] Transferred to Federal Emergency Management Agency (FEMA) in 1979.

E Estimate.

NA Not Available.

DEPARTMENT OF DEFENSE
TOTAL MILITARY OUTLAYS BY FUNCTIONAL TITLE[a] (Continued)

Fiscal Years 1976-1984
(Millions of Dollars)

1978	1979	1980	1981	1982	1983[E]	1984[E]
$103,042	$115,013	$132,840	$156,096	$182,850	$208,932	$238,600
19,976	25,404	29,021	35,191	43,271	55,211	68,238
6,971	8,836	11,124	13,193	16,793	21,435	27,066
1,794	2,084	2,461	3,513	4,338	5,795	7,427
3,048	4,553	4,222	5,217	6,739	7,249	8,506
2,140	2,949	3,222	4,145	4,588	6,308	7,343
732	958	1,271	1,368	1,647	1,934	2,117
1,349	1,618	6,721	7,755	9,167	12,489	15,779
3,942	4,406					
10,508	11,152	13,127	15,278	17,729	21,430	26,332
NA	NA	NA	NA	NA	NA	NA
36,246	38,686	42,761	50,138	57,279	61,438	64,446
25,116	26,300	28,465	33,378	38,522	40,723	42,550
1,959	2,107	2,376	3,031	3,818	4,585	5,125
9,171	10,279	11,920	13,729	14,938	16,130	16,770
1,932	2,080	2,450	2,463	2,922	4,124	4,393
1,405	1,468	1,680	1,721	1,993	2,358	2,635
82	(*b*)	(*b*)	(*b*)	(*b*)	(*b*)	(*b*)
33,578	36,424	44,770	51,920	59,674	64,643	71,649
(685)	(200)	(969)	(615)	(18)	(272)	(907)

FEDERAL PRICE DEFLATORS FOR GNP, DEFENSE, PPI and CPI

1960-1984

Year	GNP		Federal Gov't Defense Purchases		PPI Capital Equip.[a] (CY 1972 = 100)	CPI All Items[a] (CY 1972 = 100)
	FY GNP (FY 1972 = 100)	CY GNP (CY 1972 = 100)	Durables[b] (FY 1972 = 100)	Goods & Services[a] (CY 1972 = 100)		
1960	69.58	68.70	73.30	NA	76.74	70.8
1961	70.38	69.33	71.43		76.82	71.5
1962	71.39	70.61	71.39		77.15	72.3
1963	72.59	71.67	77.05		77.32	73.2
1964	73.65	72.77	76.62		78.08	74.1
1965	75.00	74.36	77.45		79.00	75.4
1966	76.98	76.76	78.28		81.00	77.6
1967	79.46	79.06	80.85		83.68	79.8
1968	82.31	82.54	84.11		86.61	83.2
1969	86.19	86.79	86.86		89.46	87.6
1970	91.08	91.45	90.96		93.72	92.8
1971	95.63	96.01	96.63		97.57	96.8
1972	100.00	100.00	100.00	100.0	100.00	100.0
1973	104.45	105.75[r]	102.94	106.6	103.35	106.2
1974	112.10	115.08[r]	106.62	115.1	117.99	117.9
1975	123.33	125.79[r]	112.87	124.9	135.98	128.7
1976	131.89	132.34[r]	123.69	132.4	145.10	136.1
1977	140.75	140.05[r]	135.53	141.9	154.48	144.9
1978	150.30	150.42[r]	146.80	152.7	166.69	155.9
1979	163.49	163.42[r]	162.72	166.0	181.17	173.5
1980	177.90	178.64[r]	181.93	187.4	200.67	197.0
1981	195.34	195.51[r]	200.99	209.0	221.17	217.4
1982[p]	209.08	207.23	224.31	226.9	233.97	230.7
1983[E]	219.52	218.1	236.47	NA	NA	NA
1984[E]	231.23	229.4	245.08	NA	NA	NA

Source: GNP and Defense Purchases from U.S. Department of Commerce, Bureau of Economic Analysis; PPI-Capital Equipment Deflator and CPI Deflator from U.S. Department of Labor, Bureau of Labor Statistics, 1967 = 100, converted to 1972 base year by AIA.

a Calendar years.
b Fiscal years.
r Revised from data previously reported by AIA.
p Preliminary.
E Estimate.
NA Not Available

Key: GNP = Gross National Product, Calendar Year (CY) or Fiscal Year (FY).
PPI = Producer Price Index for Capital Equipment.
CPI = Consumer Price Index (for all items).

FEDERAL PRICE DEFLATORS FOR AEROSPACE INDUSTRY

Calendar Years 1960-1984

Year	Aerospace Deflators (CY 1972 = 100)						
	Composite	SIC 3721	SIC 3724	SIC 3728	SIC 3761	SIC 3764	SIC 3769
1960	75.0	78.3	73.6	78.3	67.6	73.9	71.1
1961	75.2	78.1	74.2	77.9	67.5	74.3	72.6
1962	75.6	78.1	74.6	78.1	69.9	74.8	73.2
1963	75.6	78.0	74.2	78.0	71.7	74.3	72.8
1964	76.0	76.8	76.8	78.5	72.7	77.0	73.2
1965	77.4	78.5	77.6	79.9	73.6	77.7	75.4
1966	79.6	80.2	79.5	82.1	77.0	79.5	77.9
1967	82.4	82.8	81.8	84.3	80.6	82.1	80.3
1968	84.9	85.6	83.4	86.4	84.1	83.5	82.8
1969	88.3	88.9	87.3	89.1	87.3	87.4	86.4
1970	93.3	94.3	92.0	93.7	92.1	92.0	91.3
1971	97.0	98.2	95.5	97.3	95.9	95.5	95.1
1972	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1973	104.0	104.4	103.6	103.6	104.1	103.3	104.1
1974	116.0	115.6	117.5	119.6	111.3	117.3	116.7
1975	131.6	126.7	142.5	140.1	121.8	139.4	135.0
1976	144.4	140.4	154.6	153.2	132.8	150.9	147.6
1977	155.2	151.3	165.8	159.3	148.0	162.4	159.6
1978	168.2	163.5	182.5	173.4	159.1	177.1	172.3
1979	186.4	180.0	203.0	190.4	176.9	196.5	187.9
1980	209.8	202.4	229.5	213.3	201.5	221.2	210.3
1981	236.5	226.4	264.3	236.5	224.1	248.2	236.2
1982^{p}	255.0	247.9	285.2	250.5	243.0	268.8	255.9
1983^{E}	273.6	269.7	300.0	261.8	263.9	288.2	276.0
1984^{E}	292.5	290.2	318.9	274.9	283.5	308.4	295.8

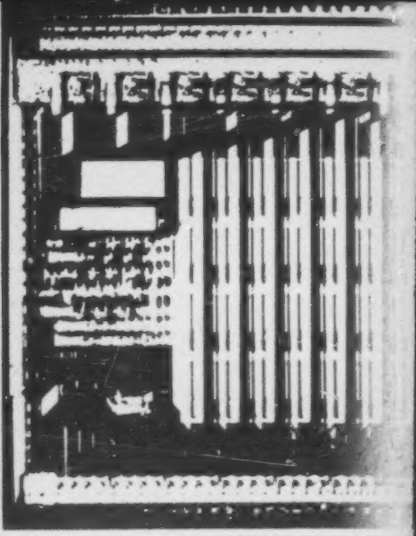
Source: Aerospace SIC Deflators through 1982 from U.S. Department of Commerce, Bureau of Economic Analysis; Aerospace Composite Deflator and 1983/84 estimates from U.S. Department of Commerce, Bureau of Industrial Economics.

p Preliminary.

E Estimate.

Key: SIC = Standard Industrial Classification.

SIC 3721 = Aircraft; SIC 3724 = Aircraft Engines and Engine Parts; SIC 3728 = Aircraft Parts; SIC 3761 = Missiles and Space Vehicles; SIC 3764 = Space Populsion; SIC 3769 = Space Equipment not elsewhere classified. Aerospace Composite aggregated by weighting individual SIC categories according to value of industry shipments.



AIRCRAFT PRODUCTION

As is traditional, aircraft production continued to account for more than half of the industry's aerospace sales, but the proportion dropped between 1981 and 1982. Despite a large increase in sales of military aircraft, overall sales of aircraft, engines and parts declined for the first time in more than a decade. The biggest reason was a sharp reduction in sales of commercial jetliners; production of general aviation planes and civil helicopters also fell off markedly.

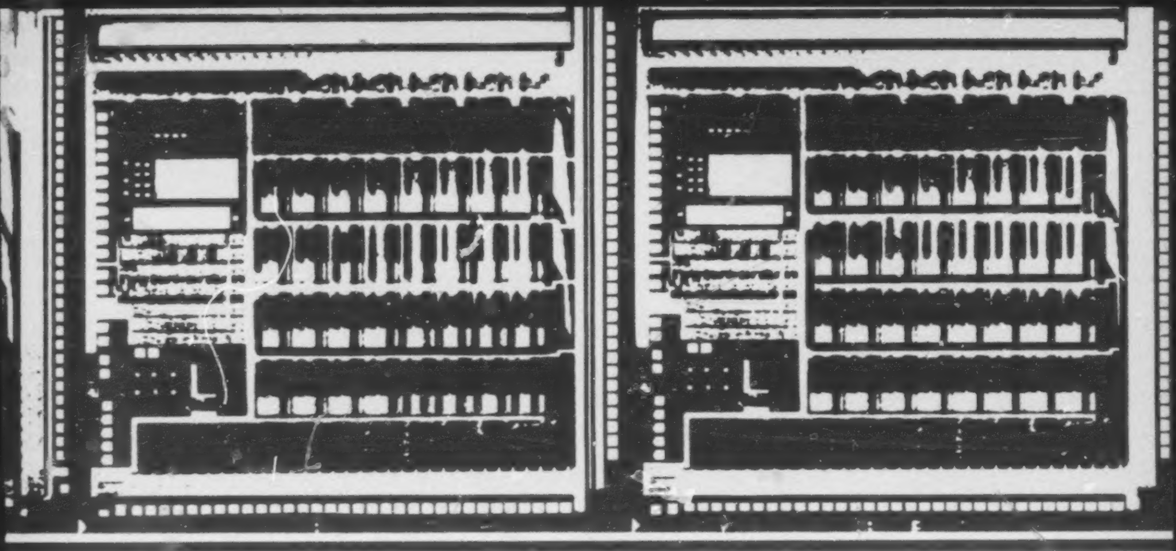
In 1982, aircraft, engine and parts sales amounted to $32.6 billion, which compares with $33.6 billion in 1981; the latter figure represented an all-time peak. Sales to the U.S. government, predominantly the Department of Defense, totaled $15.3 billion, a gain of more than $3 billion over the 1981 figure. But sales to other than U.S. government customers, at $17.3 billion, were down by almost $4 billion.

Despite the fall of civil aircraft business, the industry's backlog of orders for aircraft, engines and parts increased. At year-end 1982, it was $59.5 billion, up from $57.7 billion at the end of the previous year. U.S. government orders amounted to $25.2 billion, up from $21.4 billion. Non-government backlog amounted to $34.3 billion, still 58 percent of the total despite a decline of more than $2 billion from the previous year's level. Backlog data is an indicator of what has been happening to the civil/military aircraft sales mix since the start of the decade: government backlog increased 23 and 18 percent over the past two years, non-government backlog declined almost nine and six percent during the same period.

Among other aircraft production highlights:

- The decline of general aviation aircraft deliveries that began in 1979 continued in 1982, with deliveries of only 4,266 units, well below half of the 9,457 planes delivered in 1981. The largest drop was in the single-engine, piston-powered category, where the industry delivered 2,697 aircraft, compared with 6,268 in the previous year; there were, however, unit reductions in all categories of civil aircraft.

In terms of dollar value, general aviation recorded sales totaling $2 billion,



down from $2.9 billion in 1981 and the lowest annual sales figure—in current dollars—since 1978. The largest dollar value decline was in turboprop aircraft, down $427 million to $590 million; in the highest-priced category, turbojet-powered aircraft, 1982 value was $990 million, down $185 million from 1981.

- Civil helicopter production, which had expanded dramatically in the decade of the 1970s, continued on the downward activity curve in evidence since 1981. The rotary wing segment of the industry produced 587 helicopters in 1982, the lowest number since 1972; the figure compares with 1,072 in 1981 and the all-time record of 1,366 in 1980. Dollar value of civil helicopter shipments in 1982 was $365 million, which compares with $597 million in 1981 and $656 million in the record year 1980.
- The industry delivered 232 commercial transport aircraft in 1982, 155 fewer than in 1981. The dollar value declined by some $3.5 billion, from 1981's $9.7 billion to $6.2 billion in 1982. The transport backlog also declined, for the third straight year; at year-end 1982 it was $16.3 billion, down from $17.2 billion at the end of the previous year and from a peak level of $21.3 billion at the end of 1979. Units on order totaled 455, down from 526.

For several years prior to 1981, foreign orders had constituted more than half of U.S. transport aircraft manufacturers' backlog. At year-end of both 1981 and 1982, however, it was down to 45 percent of total value. On the books were orders from foreign customers for 196 transports valued at $7.3 billion; the comparable figures for 1981 were 213 aircraft worth $7.7 billion.

In FY 1982, Department of Defense outlays for aircraft procurement totaled $16.8 billion, up from $13.2 billion in FY 1981; the estimate for FY 1983 is $21.4 billion and for FY 1984 $27.1 billion. During FY 1983, DoD's major aircraft procurement programs are the USAF B-1B bomber, $4 billion; Navy F-18 fighter, $2.5 billion; USAF F-16 fighter, $2.2 billion; USAF F-15 fighter, $1.4 billion; Navy F-14 fighter, $1.1 billion; USAF KC-10A Advanced Tanker Cargo Aircraft, $919 million; Navy AV-8B VTOL fighter, $918 million; and Army's AH-64 attack helicopter, $895 million.

SALES OF COMPLETE AIRCRAFT, AIRCRAFT ENGINES, AND PARTS

Calendar Years 1968-1982
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft & Parts		Aircraft Engines & Parts	
		U.S. Gov't.	Other	U.S. Gov't.	Other	U.S. Gov't.	Other
CURRENT DOLLARS							
1968	$13,850	$ 7,411	$ 6,439	$ 5,697	$ 5,188	$1,714	$1,251
1969	12,764	7,161	5,603	5,382	4,517	1,779	1,086
1970	13,466	7,586	5,880	5,674	4,683	1,912	1,197
1971	11,392	6,313	5,079	4,953	4,093	1,360	986
1972	10,153	4,954	5,199	3,666	4,085	1,288	1,114
1973	12,278	5,539	6,739	4,231	5,322	1,308	1,417
1974	13,542	5,982	7,560	4,562	5,846	1,420	1,714
1975	14,656	6,859	7,797	5,269	6,001	1,590	1,796
1976	15,936	8,314	7,622	6,336	5,900	1,978	1,722
1977	16,378	8,848	7,530	6,855	5,670	1,993	1,860
1978	19,305	8,724	10,581	6,853	7,873	1,871	2,708
1979	24,672	8,649	16,023	6,378	12,701	2,271	3,322
1980	29,524	9,427	20,097	6,724	15,901	2,703	4,196
1981[r]	33,574	12,047	21,527	8,197	16,877	3,850	4,650
1982	32,621	15,283	17,338	11,276	12,979	4,007	4,359
CONSTANT DOLLARS (1972 = 100)[a]							
1968	$16,780	$ 8,979	$ 7,801	$ 6,902	$ 6,285	$ 2,077	$1,516
1969	14,707	8,251	6,456	6,201	5,205	2,050	1,251
1970	14,725	8,295	6,430	6,204	5,121	2,091	1,309
1971	11,865	6,575	5,290	5,159	4,263	1,417	1,027
1972	10,153	4,954	5,199	3,666	4,085	1,288	1,114
1973[r]	11,610	5,238	6,373	4,001	5,033	1,237	1,340
1974[r]	11,767	5,198	6,569	3,964	5,080	1,234	1,489
1975[r]	11,651	5,453	6,198	4,189	4,771	1,264	1,428
1976[r]	12,042	6,282	5,759	4,788	4,458	1,495	1,301
1977[r]	11,694	6,318	5,377	4,895	4,049	1,423	1,328
1978[r]	12,834	5,800	7,034	4,556	5,234	1,244	1,800
1979[r]	16,402	5,750	10,652	4,240	8,444	1,510	2,208
1980[r]	16,527	5,277	11,250	3,764	8,901	1,513	2,349
1981[r]	17,173	6,162	11,011	4,193	8,632	1,969	2,378
1982	15,741	7,375	8,367	5,441	6,263	1,934	2,103

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] Based on GNP implicit price deflator; detail may not add to totals because of rounding.

[r] Revised.

BACKLOG OF COMPLETE AIRCRAFT, AIRCRAFT ENGINES, AND PARTS

As of December 31, 1968-1982
(Millions of Dollars)

Year	GRAND TOTAL	TOTAL		Aircraft & Parts		Aircraft Engines & Parts	
		U.S. Gov't.	Other	U.S. Gov't.	Other	U.S. Gov't.	Other
CURRENT DOLLARS							
1968	$20,559	$ 8,150	$12,409	$ 5,999	$10,609	$2,151	$1,800
1969	19,188	7,089	12,099	5,270	10,340	1,819	1,759
1970	15,713	5,913	9,800	4,663	8,601	1,250	1,199
1971	14,280	6,221	8,059	4,876	7,123	1,345	936
1972	15,632	7,027	8,605	5,705	7,355	1,322	1,250
1973	16,365	7,815	8,550	6,312	7,232	1,503	1,318
1974	19,391	9,789	9,602	7,698	7,791	2,091	1,811
1975	18,892	10,751	8,141	8,743	6,646	2,008	1,495
1976	20,879	11,950	8,929	9,905	7,416	2,045	1,513
1977	25,063	12,471	12,592	9,557	10,152	2,914	2,440
1978	33,869	14,897	18,972	11,759	16,508	3,138	2,464
1979	50,484	17,316	33,168	13,331	27,955	3,985	5,213
1980[r]	57,235	17,435	39,800	12,702	33,258	4,733	6,542
1981[r]	57,728	21,384	36,344	15,548	29,007	5,836	7,337
1982	59,497	25,197	34,300	18,354	27,592	6,843	6,708
CONSTANT DOLLARS (1972 = 100)[a]							
1968	$24,908	$ 9,874	$15,034	$ 7,268	$12,853	$2,606	$2,181
1969	22,109	8,168	13,941	6,072	11,914	2,096	2,027
1970	17,182	6,466	10,716	5,099	9,405	1,367	1,311
1971	14,873	6,480	8,394	5,079	7,419	1,401	975
1972	15,632	7,027	8,605	5,705	7,355	1,322	1,250
1973[r]	15,475	7,390	8,085	5,969	6,839	1,421	1,246
1974[r]	16,850	8,506	8,344	6,689	6,770	1,817	1,574
1975[r]	15,019	8,547	6,472	6,950	5,283	1,596	1,188
1976[r]	15,777	9,030	6,747	7,485	5,604	1,545	1,143
1977[r]	17,896	8,905	8,991	6,824	7,249	2,081	1,742
1978[r]	22,516	9,904	12,613	7,817	10,975	2,086	1,638
1979[r]	30,892	10,596	20,296	8,158	17,106	2,439	3,190
1980[r]	32,039	9,760	22,279	7,110	18,617	2,649	3,662
1981[r]	29,527	10,938	18,589	7,953	14,837	2,985	3,753
1982	28,711	12,159	16,552	8,857	13,315	3,302	3,237

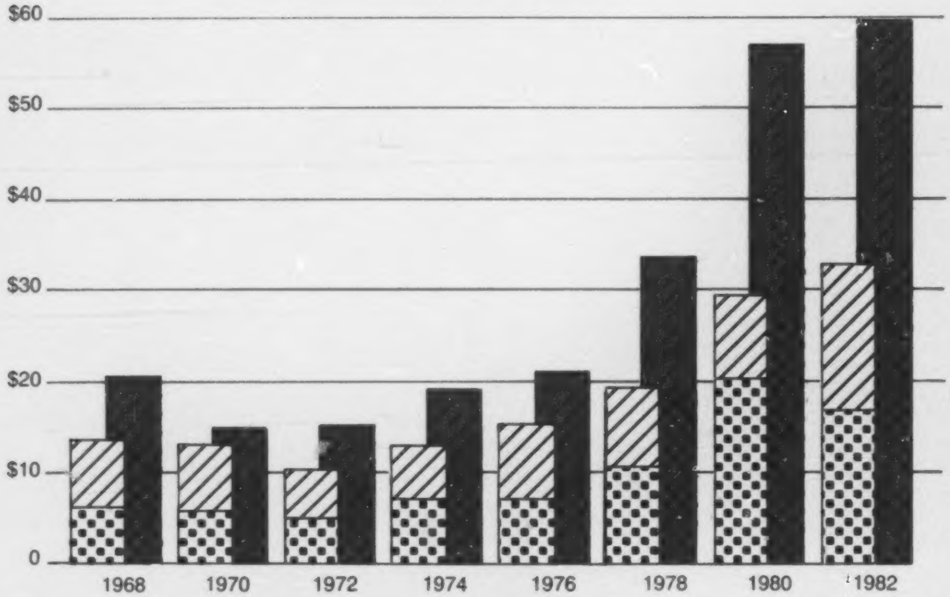
Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] Based on GNP implicit price deflator; detail may not add to totals because of rounding.

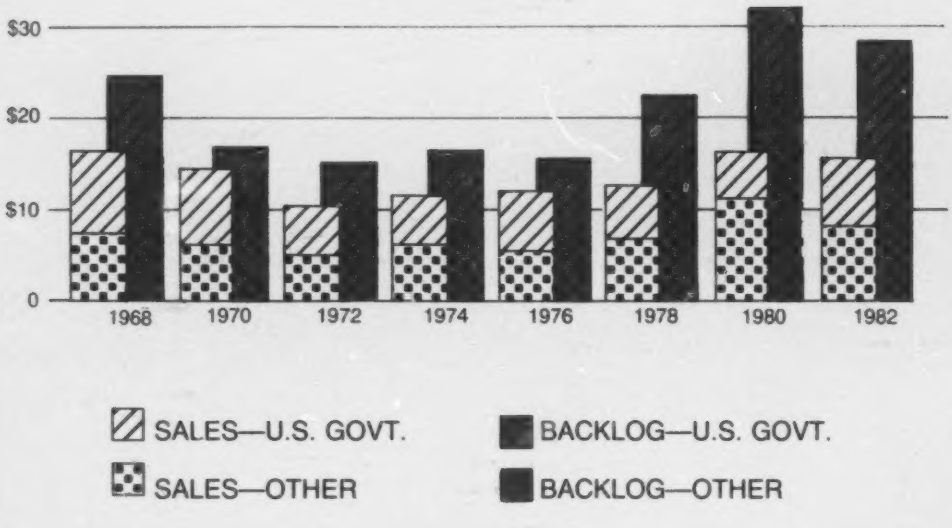
[r] Revised.

SALES AND BACKLOG OF AIRCRAFT, ENGINES, AND PARTS

(Billions of Current Dollars)



(Billions of Constant Dollars)
1972 = 100



Source: Aerospace Industries Association

U.S. AIRCRAFT PRODUCTION

Calendar Years 1969-1982

CIVIL AIRCRAFT

Year	TOTAL	Domestic Shipments[a]			Export Shipments		
		Transports[a]	Helicopters	General Aviation	Transports	Helicopters	General Aviation
1969	13,505	332	282	9,996	182	252	2,461
1970	8,076	127	150	5,246	184	332	2,037
1971	8,158	50	171	5,900	173	298	1,566
1972	10,576	79	319	7,702	148	256	2,072
1973	14,709	143	342	10,482	151	428	3,163
1974	15,326	91	433	9,903	241	395	4,263
1975	15,251	127	528	10,804	188	336	3,268
1976	16,429	64	442	12,232	158	315	3,218
1977	17,913	54	527	13,441	101	321	3,469
1978	18,962	130	536	14,346	111	368	3,471
1979	18,450	176	560	13,177	200	459	3,878
1980	13,634	150	841	8,703	237	525	3,178
1981	10,916	132	619	6,840	255	453	2,617
1982	5,085	111	333	3,326	121	254	940

MILITARY AIRCRAFT

Year	TOTAL	U.S. Military Agencies	Exports		
			Total	FMS[b]	Commercial[c]
1969	4,290	3,644	646	NA	NA
1970	3,720	3,085	635	NA	NA
1971	2,914	2,232	682	NA	NA
1972	2,530	1,993	537	124	413
1973	1,821	1,243	578	129	449
1974	1,513	799	714	365	349
1975	1,779	844	935	525	410
1976	1,318	625	693	518	175
1977	1,134	454	680	408	272
1978	996	467	529	256	273
1979	837	531	306	203	103
1980	1,047[r]	625[r]	422	194	228
1981	1,062[r]	703[r]	359	215	144
1982	1,154	685	469	68	401

Source: Civil shipments data from company reports to AIA and General Aviation Manufacturers Association. Military acceptances for use of U.S. military agencies and for reimbursable programs reported by USAF, USN and Army. Export data from Dept. of Commerce (Bureau of the Census) Report FT410.

[a] Prior to 1976, includes the C-130 military transport.

[b] Also includes acceptances of NATO AWACS aircraft.

[c] Military aircraft exported directly from manufacturer to foreign government.

NA Not available.

[r] Revised.

CIVIL AIRCRAFT SHIPMENTS

Calendar Years 1968-1982

Year	TOTAL	Transport Aircraft[a]	Helicopters	General Aviation
NUMBER OF AIRCRAFT SHIPPED				
1968	14,922	702	522	13,698
1969	13,505	514	534	12,457
1970	8,076	311	482	7,283
1971	8,158	223	469	7,466
1972	10,576	227	575	9,774
1973	14,709	294	770	13,645
1974	15,326	332	828	14,166
1975	15,251	315	864	14,072
1976	16,429	222	757	15,450
1977	17,913	155	848	16,910
1978	18,962	241	904	17,817
1979	18,450	376	1,019	17,055
1980	13,634	387	1,366	11,881
1981	10,916	387	1,072	9,457
1982	5,085	232	587	4,266
VALUE—Millions of Dollars				
1968	$ 4,267	$ 3,789	$ 57	$ 421
1969	3,598	2,939	75	584
1970	3,546	3,158	49	339
1971	2,984	2,594	69	321
1972	3,308	2,660	90	558
1973	4,665	3,718	121	826
1974	5,091	3,993	189	909
1975	5,086	3,779	274	1,033
1976	4,592	3,078	285	1,229
1977	4,451	2,649	251	1,551
1978	6,458	4,308	328	1,822
1979	10,644	8,030	403	2,211
1980	13,058	9,895	656	2,507
1981	13,223	9,706	597	2,920
1982	8,610	6,246	365	1,999

Source: Transport Aircraft and Helicopters: Aerospace Industries Association, company reports.
General Aviation: General Aviation Manufacturers' Association and Aerospace Industries Association.

[a] U.S.-manufactured fixed-wing aircraft over 33,000 pounds empty weight, including all jet transports plus the four-engine turboprop-powered Lockheed L-100.

CIVIL TRANSPORT AIRCRAFT BACKLOG

As of December 31, 1978-1982

Company and Model	1978	1979	1980	1981	1982
TOTAL AIRCRAFT ON ORDER					
(Domestic and Foreign Orders)	622	828	715	526	455[b]
Value (Millions of Dollars	$13,098	$21,322	$20,799	$17,198	$16,321[b]
Boeing—TOTAL	426	611	535	447	356
B-707	1	—	—	—	—
B-727	195	212	104	35	19
B-737	111	159	175	146	93
B-747	89	106	71	37	26
B-757	—	40	49	82	80
B-767	30	94	136	147	138
Lockheed—TOTAL	40	56	50	27	11
L-1011	40	56	47	21	7
L-100	—	—	3	6	4
McDonnell Douglas—TOTAL	156	161	130	52	88[b]
DC-9	101	108	105	43	85[b]
DC-10	55	53	25	9	3
TOTAL FOREIGN ORDERS	304	436	401	213	196
Value (Millions of Dollars)	$ 7,100	$11,848	$12,166	$ 7,702	$ 7,322
Boeing—TOTAL	194	312	303	180	142
B-707	1	—	—	—	—
B-727	51	74	48	10	1
B-737	77	127	134	71	45
B-747	65	88	70	37	26
B-757	—	19	22	22	22
B-767	—	4	29	40	48
Lockheed—TOTAL	17	33	32	17	9
L-1011	17	33	29	11	5
L-100	—	—	3	6	4
McDonnell Douglas—TOTAL	93	91	66	16	45
DC-9	58	58	46	8	42
DC-10	35	33	20	8	3

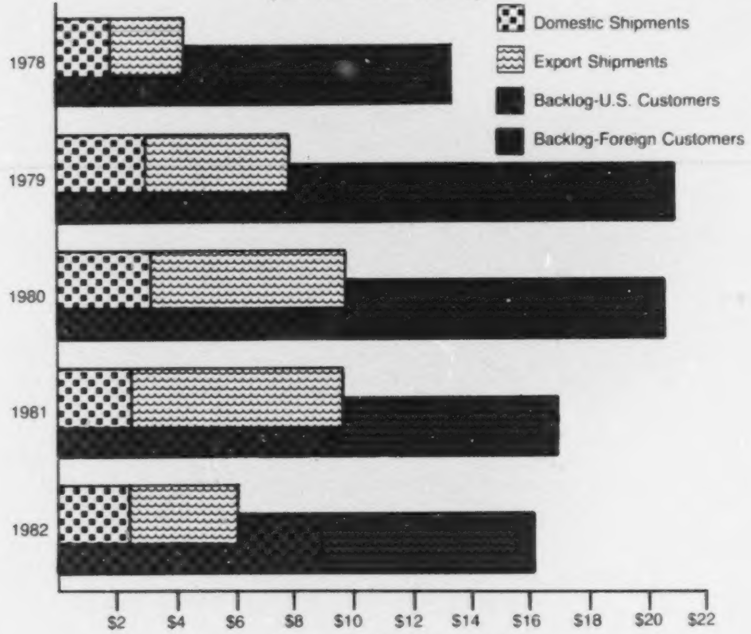
Source: Aerospace Industries Association, company reports.

[a] Firm unfilled orders, excluding options, for U.S. manufactured transport aircraft over 33,000 pounds, including all jet transports plus the turboprop-powered Lockheed L-100.

[b] Includes 35 new DC-9 aircraft contracted for manufacturer/airline lease.

SHIPMENTS AND BACKLOG OF CIVIL TRANSPORT AIRCRAFT

(Billions of Dollars)



Source: Aerospace Industries Association

SHIPMENTS OF CIVIL TRANSPORT AIRCRAFT

Calendar Years 1978-1982

Company and Model	1978	1979	1980	1981	1982
TOTAL					
Number of Aircraft Shipped	241	376	387	387	232
Value (Millions of Dollars)	$4,308	$8,030	$9,895	$9,706	$6,246
Boeing—TOTAL	193	281	296	255	169
B-707	3	1	—	—	1
B-727	118	136	131	94	26
B-737	40	77	92	108	95
B-747	32	67	73	53	25
B-757	—	—	—	—	2
B-767	—	—	—	—	20
Lockheed—TOTAL	10	21	26	36	17
L-1011	8	14	24	28	14
L-100	2	7	2	8	3
McDonnell Douglas—TOTAL	38	74	65	96	46
DC-9	20	39	25	77	41
DC-10	18	35	40	19	5

Source: Aerospace Industries Association, company reports.

SPECIFICATIONS OF U.S. CIVIL JET TRANSPORT AIRCRAFT[a]

On Order or In Production as of 1982

Number of Engines and Crew, and Model Designation[b]	Initial Service	Typical Seating Capacity (Mixed) Class)	Operating Empty Weight (000's lbs)	Maximum Takeoff Gross Weight (000's lbs)	Range (Nautical Miles)[c]	Engines (Manufacturer[d] and Model)
FOUR ENGINES/CREW OF 3						
747-200*	1971	452	379	775-833	5,350	P&W JT9D-7AW
747SP*	1976	331	325	700	6,100	P&W JT9D-7AW
747-300 (EUD)*	1983	496	388	775-785	5,500	P&W JT9D-7AW
THREE ENGINES/CREW OF 3						
727-200 Advanced	1972	143-145	98	186-191	2,100	P&W JT8D-9A/15/17/17R
L-1011-100*	1975	304	246	466	3,460-3,705	RR RB211-22B
L-1011-200*	1977	304	249	466	3,605	RR RB211-524B4
L-1011-500*	1979	242	246	496-504	5,040-5,225	RR RB211-524B4
DC-10-10*	1971	250	245	440	3,750	GE CF6-6D
DC-10-15*	1981	278	247	455	3,800-4,000	GE CF6-50C2-F
DC-10-30*	1972	275	271	580	5,470	GE CF6-50C2
DC-10-40*	1972	275	273	580	5,300	P&W JT9D-59A
TWO ENGINES/CREW OF 2						
737-200 Advanced	1971	110-115	61	116-119	1,800	P&W JT8D-9A/15/17/17R
737-300	1984	128-132	72	125-136	2,300	CFMI-CFM56-3
757-200	1982	178-186	128-130	220-240	2,300-3,800	RR RB211-535C/E4 or P&W 2037
767-200*	1982	211-220	178-179	282-310	3,650	P&W JT9D-7R4D or GE CF6-80A
DC-9-30	1967	93	59	108	1,685	P&W JT8D-15
DC-9-Super 80	1980	142	79	147	2,010	P&W JT8D-217
DC-9-Super 83	1984	142	80	160	2,650	P&W JT8D-219

Source: Aerospace Industries Association, based on company reports.

[a] All jet-powered passenger transport aircraft 33,000 pounds or more empty weight.

[b] Manufacturers are The Boeing Company (727, 737, 747, 757, and 767), Lockheed Corporation (L-1011), and McDonnell Douglas Corporation (DC-9 and DC-10).

[c] Full passenger load and baggage.

[d] P&W = Pratt and Whitney Aircraft Company of United Technologies Corporation; GE = General Electric Company; RR = Rolls-Royce Limited; CFMI = General Electric/Snecma.

* Wide-body aircraft.

COMMERCIAL HELICOPTER SHIPMENTS[a]

Calendar Years 1978-1982

Company and Model	1978	1979	1980	1981	1982
COMMERCIAL SHIPMENTS	935	1,054	1,452	1,105	629
Value (Millions of Dollars)	$367	$ 457	$ 754	$ 783	$442
CIVIL SHIPMENTS	904	1,019	1,366	1,072	587
Value (Millions of Dollars)	$328	$ 403	$ 656	$ 597	$365
Bell—TOTAL	438	612	780	609	272
205	23	18	30[c]	—	—
206 series	322	469	550	476	193
212	50	86	116	49	32
214 series	16	8	7	12	10
222	—	—	41	21	15
412	—	—	—	51	22
AH-1S[b]	—	1	1	—	—
UH-1H[b]	27	30	35	—	—
Boeing Vertol—TOTAL	4	4	6	28	9
CH-47/414[b]	4	4	6	23	8
234	—	—	—	5	1
Brantley-Hynes—TOTAL	11	2	—	—	—
B-2B	11	2	—	—	—
Enstrom-TOTAL	91	46	48	46	24
F-28 series	44	27	18	29	17
280 series	47	19	30	17	7
Hiller—TOTAL	52	43	49	30	32[c]
12-E series	52	43	41	23	26[c]
12-ET series	—	—	8[c]	6	3
FH-1100	—	—	—	1	3
Hughes—TOTAL	312	306	401	186	176[c]
300 series	116	110	136	50	54
500 series	196	196	265[c]	136[c]	122[c]
Robinson—TOTAL	—	—	78	156	88
R22	—	—	78	156	88
Sikorsky (UTC)—TOTAL	27	41	90	50	28
S-61	27	5	5	—	—
S-76	—	36	85	50[c]	28

Source: Aerospace Industries Association, company reports.

NOTE: All data exclude production by foreign licensees.

[a] Shipments to customers other than the U.S. Government, including all civil shipments plus commercial (manufacturer-to-customer) military exports, and excluding deliveries to U.S. military agencies for shipment to foreign governments under Foreign Military Sales.

[b] Military configuration for commercial export sale.

[c] Includes the following helicopters commercially exported in military configuration: 4 Bell 205's, 4 Hiller 12-ET's, and 36 Hughes 500's in 1980; 2 Hughes 500's and 8 Sikorsky S-76's in 1981; 20 Hiller 12-E's and 14 Hughes 500's in 1982.

GENERAL AVIATION AIRCRAFT SHIPMENTS

By Selected Manufacturers
Calendar Years 1978-1982

	1978	1979	1980	1981	1982
NUMBER OF AIRCRAFT SHIPPED	17,817	17,055	11,881	9,457	4,266
Agricultural	748	593	357	340	174
Single-Engine, Piston	13,651	12,693	8,283	6,268	2,697
Multi-Engine, Piston	2,630	2,843	2,116	1,542	678
Turboprop	548	637	795	918	458
Turbojet	240	289	330	389	259
VALUE OF SHIPMENTS[a] (Millions of Dollars)	$ 1,822	$ 2,211	$ 2,507	$2,920	$1,999
Agricultural	33	35	25	24	199
Single-Engine, Piston	486	490	365	315	
Multi-Engine, Piston	492	557	402	389	220
Turboprop	393	550	874	1,017	590
Turbojet	418	579	841	1,175	990
Number of Aircraft By Selected Manufacturer					
Ayres	134	99	44	59	25
Beech	1,367	1,508	1,394	1,242	526
Bellanca	370	443	103	—	—
Cessna	8,770	8,400	6,393	4,680	2,140
Fairchild	51	70	86	85	49
Gates Learjet	102	107	120	138	99
Gulfstream American	933	400	167	284	96
Lake	98	96	79	52	22
Lockheed Jetstar	9	7	4	—	—
Maule	88	67	59	44	39
Mooney	379	439	332	330	188
Piper	5,272	5,255	2,954	2,495	1,048
Rockwell International	244	164	146	40	—
Schweizer Aircraft	—	—	—	8	34

Source: General Aviation Manufacturers' Association and Aerospace Industries Association.

[a] Manufacturers' net billing price.

MILITARY AIRCRAFT ACCEPTED BY U.S. MILITARY AGENCIES

Number and Flyaway Value
Calendar Years 1968-1982

Year	TOTAL	Bomber/ Patrol	Fighter/ Attack	Trans-port/ Tanker	Trainer	Heli-copter	Other
NUMBER							
1968	4,440	34	1,007	18	292	2,800	289
1969	3,644	31	792	44	295	2,165	317
1970	3,085	66	734	37	173	1,944	131
1971	2,232	48	386	42	135	1,587	34
1972	2,117	13	563	29	148	1,312	52
1973	1,372	30	422	22	90	808	—
1974	1,110	50	478	27	49	506	—
1975	1,369	62	624	34	40	601	8
1976	1,143	55	646	67	11	348	16
1977	862	44	488	25	12	273	20
1978	723	30[r]	478	28[r]	—	166	21
1979	734	17[r]	529	16[r]	—	158	14
1980[r]	819	16	551	15	18	189	30
1981[r]	918	19	649	17	60	158	15
1982	753	26	479	14	60	168	6
FLYAWAY VALUE—Millions of Dollars							
1968	$3,871	$117	$2,451	$ 81	$167	$905	$150
1969	3,693	248	2,204	101	164	845	131
1970	3,920	545	1,940	555	111	694	75
1971	2,996	397	1,322	688	112	469	8
1972	3,247	129	2,068	536	100	396	18
1973	2,571	325	1,490	348	140	268	—
1974	2,224	584	1,222	101	111	206	—
1975	3,172	599	2,054	128	27	359	5
1976	4,729	547	3,421	340	27	384	10
1977	4,364	499	3,190	331	14	316	14
1978	4,664	689[r]	3,496	237[r]	—	225	17
1979	5,470	442[r]	4,660	136[r]	—	219	13
1980[r]	6,514	475	5,282	178	32	516	31
1981[r]	8,446	526	6,518	509	32	825	19
1982	8,720	954	6,411	410	42	894	9

Source: Departments of the Army, Navy, and Air Force.

NOTE: Data exclude gliders and targets, and include spares, spare parts, and support equipment that are procured with the aircraft. Effective 1972, includes aircraft accepted for shipment to foreign governments for military assistance programs and foreign military sales. 1972-1975, flyaway value does not include the value of planes produced for the security assistance programs and accepted by the USAF.

[r] Revised.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES AIR FORCE[a] BY TYPE AND MODEL

Calendar Years 1981 and 1982
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]		Weapon System Cost[c]	
	1981	1982	1981	1982	1981	1982
AIR FORCE—TOTAL	398	366	$3,687	$4,115	$4,081	$4,951
Fighter/Attack—TOTAL	385	344	3,109	3,307	3,458	4,005
A-7K	16	10	141	145	155	172
A-10A	141	89	740	668	812	783
F-15A/B/C/D	67	51	1,018	1,000	1,101	1,168
F-16A/B	161	194	1,210	1,494	1,390	1,882
Transports/Tankers—TOTAL	10	14	391	410	403	440
C-130H	4	7	41	78	42	80
KC-10A	6	7	350	332	361	360
Command/Control—TOTAL	3	8	187	398	220	506
E-3A	2	4	162	308	194	406
TR-1A	1	4	25	90	26	100

Source: Department of the Air Force.

NOTE: Costs shown are approximate. Calendar year acceptances may derive from procurement quantities funded in more than one fiscal year.

[a] Air Force acceptances for own use; exclude FMS/MAP shipments.

[b] Flyaway Cost includes airframe, engines, electronics, communications, armament, other installed equipment and non-recurring costs associated with the manufacture of the aircraft.

[c] Weapon System Cost includes flyaway costs, peculiar ground equipment, training equipment and technical data.

r Revised.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES ARMY[a] BY TYPE AND MODEL

Calendar Years 1981 and 1982
(Millions of Dollars)

Type and Model	Number		Flyaway Cost[b]	
	1981	1982	1981	1982
ARMY—TOTAL	151	143	$657	$584
Helicopters—TOTAL	141	137	645	575
AH-1S	21	11	77	31
UH-60A	120	126	568	544
Fixed-Wing—TOTAL	10	6	12	9
C-12	10	6	12	9

Source: Department of the Army.

[a] Army acceptances for own use; exclude FMS/MAP shipments.

[b] Flyaway cost includes airframes, engines, electronics, communications, armament and other installed equipment.

r Revised.

MILITARY AIRCRAFT ACCEPTANCES BY UNITED STATES NAVY[a] BY TYPE AND MODEL

Calendar Years 1980, 1981 and 1982
(Millions of Dollars)

Type and Model	Number			Flyaway Cost[b]			Weapon System Cost[c]		
	1980	1981	1982	1980	1981	1982	1980	1981	1982
NAVY—TOTAL	100	154[r]	176	$1,574[r]	$1,974[r]	$2,760	$2,040[r]	$2,536[r]	$3,518
Patrol—TOTAL	12	12	12	206	260	320	347	307	420
P-3C	12	12	12	206	260	320	347	307	420
Attack—TOTAL	27[r]	24	18	332	406	457	491[r]	564[r]	577
A-6E	6[r]	12	12	102	207	270	170[r]	286[r]	300
EA-6B	6	6	6	127	157	187	186[r]	224[r]	277
A-7E	15	6	—	103	42	—	135	54	—
Fighters—TOTAL	34	40[r]	59	892[r]	1,009[r]	1,638	1,043[r]	1,309[r]	2,087
F-14A	30	30	30	717	624[r]	761	782	755[r]	875
F/A-18[d]	4	10[r]	29	175[r]	385[r]	877	261[r]	554[r]	1,212
Helicopters—TOTAL	2	15	27	38	185[r]	303	40	226[r]	383
CH-53E	2	15	24	38	185[r]	301	40	226[r]	381
TH-57	—	—	3	—	—	2	—	—	2
Support—TOTAL	25	63[r]	60	106	114[r]	42	119[r]	130[r]	51
C-9B	—	2	—	—	36	—	—	41	—
UC-12B	22	—	—	24	—	—	26	—	—
T-34	—	60[r]	60	—	42[r]	42	—[r]	42[r]	51
EC-130Q	3	1	—	82	36	—	93	47	—

Source: Department of the Navy.

[a] Navy acceptances for own use; excludes FMS shipments.

[b] Flyaway Cost includes airframe, engines, electronics, communications, armament and other installed equipment.

[c] Weapon System Cost includes flyaway items, initial spares, ground equipment, training equipment and other support items.

[d] Four aircraft in 1980 and five in 1981 were pilot production aircraft; other five in 1981 and twenty in 1982 were limited production aircraft; only nine 1982 acceptances were full-production aircraft; thus cost figures are not representative of full-rate production costs.

[r] Revised.

MILITARY AIRCRAFT ACCEPTANCES FOR REIMBURSABLE PROGRAMS[a] BY ACCEPTING AGENCY, TYPE AND MODEL

Calendar Years 1981 and 1982
(Millions of Dollars)

Accepting Agency, Type and Model	Number of Aircraft Accepted		Flyaway Cost[b]	
	1981	1982	1981	1982
TOTAL ACCEPTANCES FOR REIMBURSABLE PROGRAMS	215	68	$2,128	$1,261
AIR FORCE—TOTAL	204	64	$2,040	$1,182
Fighter/Attack—TOTAL	200	58	1,994	1,009
F-5E	44	12	242	72
F-5F	17	2	102	13
F-15C/D	10	44	290	924
F-16A/B	129	—	1,360	—
Transport/Tankers—TOTAL	4	—	46	—
C-130	4	—	46	—
Command/Control—TOTAL	—	2	—	157
E-3A (NATO AWACS)	—	2	—	157
Helicopters—TOTAL	—	4	—	16
214	—	2	—	11
412	—	2	—	5
NAVY—TOTAL	4	4	$ 79	$ 79
Patrol—TOTAL	4	4	79	79
P-3C	4	4	79	79
ARMY—TOTAL	7	—	$ 9	$ —
Helicopters—TOTAL	2	—	2	—
205-A	2	—	2	—
Fixed-Wing—TOTAL	5	—	7	—
C-12D	5	—	7	—

Source: Department of the Air Force, Navy and Army.

[a] Foreign Military Sales and NATO AWACS Program.

[b] Flyaway cost includes airframes, engines, electronics, communications, armament, other installed equipment and nonrecurring costs associated with the manufacture of the aircraft.

MILITARY AIRCRAFT PROGRAM PROCUREMENT[a]

Fiscal Years 1982, 1983 and 1984
(Millions of Dollars)

Agency, Type and Model	1982		1983^E		1984^E	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
A-10 A/B Thunderbolt II	20	$ 240.2	20	$ 289.1	—	$ —
B-1B	1	1,612.0	7	4,033.5	10	6,179.6
B-52G/H Cruise Missile Carrier Aircraft Modification (Ext.)	40	78.7	41	119.5	27	69.2
B-52H Cruise Missile Carrier Aircraft Modification (Int.)	—	—	—	—	15	156.8
B-52G/H Avionics Modernization	61	268.5	64	313.6	41	173.8
C-5A Wing Modification	18	190.6	18	188.7	24	246.6
C-5B Galaxy	—	—	1	803.4	4	1,403.7
C-130H Hercules	8	112.7	8	184.3	—	—
E-3A (AWACS)	2	262.1	2	149.5	—	76.2
European Distribution System Aircraft (EDSA)	—	—	2	6.5	16	36.0
EF-111A Modification	12	276.9	9	203.3	—	—
F-5F	3	23.0	3	29.1	—	—
F-15 Eagle	36	1,154.5	39	1,431.0	48	2,127.4
F-16 Falcon	120	2,231.1	120	2,246.6	120	2,123.6
KC-10A (ATCA)	4	234.5	8	919.3	8	813.0
KC-135 Re-engining/Modern	9	238.0	17	469.6	31	942.4
TR-1/U-2	6	186.6	5	194.9	5	261.5
UH-60A Blackhawk	6	37.7	—	—	—	—
LANTIRN (Night Precision Attack)	—	5.0	—	15.4	—	4.5
PLSS (Precision Location)	—	1.7	—	1.8	—	9.1
Tactical Fighter Derivative Aircraft	—	—	—	—	—	21.4
MC-130H Combat Talon	—	27.0	1	43.0	2	71.7
Wide Bodied Cargo Airlift	—	—	3	143.3	—	—
T-46A Next Generation Trainer	—	—	—	—	—	5.8
ARMY						
AH-1S Cobra/Tow	12	$ 53.8	11	$ 53.3	—	$ —
AH-64 Attack Helicopter	11	537.0	48	895.2	112	1,470.4
C-12	6	10.5	12	21.0	—	—
RC-12D	—	—	6	45.3	—	33.0
CH-47 Modernization	19	219.1	24	262.7	36	344.0
UH-60A Blackhawk	96	638.2	96	584.4	84	480.6
EH-60A Quick Fix	—	—	—	27.3	12	164.9
NAVY						
A-6E Intruder	12	$ 283.2	8	$ 244.3	6	$ 232.3
AV-8B	12	667.3	21	917.5	32	1,047.6

(Continued on next page)

MILITARY AIRCRAFT PROGRAM PROCUREMENT[a] (Continued)

Agency, Type and Model	1982		1983[E]		1984[E]	
	No.	Cost	No.	Cost	No.	Cost
NAVY (Continued)						
C-2 Greyhound	—	$ 37.0	8	$ 284.9	8	$ 226.3
C-9B Skytrain II	—	—	—	16.2	—	—
CH-53E Super Stallion	14	251.3	11	227.7	11	248.3
E-2C Hawkeye	6	262.8	6	293.5	6	345.8
EA-6B Prowler	6	275.8	6	332.5	6	442.3
EC-130Q Hercules	2	74.5	—	35.9	—	—
F-14A Tomcat	30	1,176.0	24	1,120.2	24	1,149.6
F-18 Hornet	63	2,422.2	84	2,483.4	84	2,726.2
KC-130T Hercules	4	64.0	2	30.0	—	15.7
P-3C Orion	12	430.8	6	299.1	5	289.6
SH-60B Seahawk LAMPS	18	706.7	27	788.3	21	596.0
SH-2F Seasprite (LAMPS MK-I)	18	186.2	18	175.1	12	123.4
T-34C Mentor	60	51.5	30	30.3	38	40.6
TH-57A Sea Ranger	30	22.6	21	26.9	21	31.4
EP-3	—	—	—	24.6	2	89.7
Adversary Aircraft	—	—	—	—	4	32.3
VTXTS (FCLP)	—	—	—	—	—	4.9
ECX	—	—	—	—	—	107.7
FEWSG	—	—	—	—	1	27.4

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget, (Annually).
NOTE See Research and Development Chapter for aircraft program RDT&E authorization data.
a Total Obligation Authority for procurement, including initial spares.
E Estimate.

ACTIVE U.S. MILITARY AIRCRAFT IN CONTINENTAL U.S. [a]

Fiscal Years 1975-1984

Fiscal Year	Total	Fixed Wing Aircraft				Helicopter
		Total	Jet	Turboprop	Piston	
1975	19,889	12,751	9,526	1,298	1,927	7,138
1976	19,775	12,126	9,255	1,511	1,360	7,649
1977	18,670	11,625	9,168	1,382	1,075	7,045
1978	18,931	11,748	8,898	1,794	1,056	7,183
1979	18,526	11,365	8,656	1,859	850	7,161
1980	18,969	11,362	8,794	1,869	699	7,607
1981	19,363	11,645	9,111	1,943	591	7,718
1982[p]	20,077	12,040	9,575	1,944	521	8,037
1983[E]	20,246	12,044	9,583	1,989	472	8,202
1984[E]	20,504	12,189	9,670	2,096	423	8,315

Source: Department of Defense, Office of the Secretary of Defense, reported in "FAA Aviation Forecasts" (Annually).
a Includes Army, Air Force, Navy, and Marine regular service aircraft, as well as Reserve and National Guard aircraft.
p Preliminary.
E Estimate.

DEPARTMENT OF DEFENSE OUTLAYS FOR AIRCRAFT PROCUREMENT

By Agency
Fiscal Years 1960-1984
(Millions of Dollars)

Year	TOTAL AIRCRAFT PROCUREMENT	Air Force	Navy	Army
1960	$ 6,272	$ 4,414	$1,765	$ 93
1961	5,898	3,926	1,832	140
1962	6,659	4,387	2,102	170
1963	6,309	3,747	2,328	234
1964	6,053	3,894	1,859	300
1965	5,200	3,115	1,739	346
1966	6,635	4,074	2,021	540
1967	8,411	4,842	2,607	962
1968	9,462	5,079	3,244	1,139
1969	9,177	5,230	2,821	1,126
1970	7,948	4,623	2,488	837
1971	6,631	3,960	2,125	546
1972	5,927	3,191	2,347	389
1973	5,066	2,396	2,557	113
1974	5,006	2,078	2,806	122
1975	5,484	2,211	3,137	136
1976	6,520	3,323	3,061	136
Tr. Qtr.	1,557	859	672	26
1977	6,608	3,586	2,721	301
1978	6,971	3,989	2,602	380
1979	8,836	5,138	3,140	558
1980	11,124	6,647	3,689	788
1981	13,193	7,941	4,397	855
1982	16,793	9,624	5,872	1,297
1983^{E}	21,435	12,447	7,553	1,436
1984^{E}	27,066	15,379	9,318	2,369

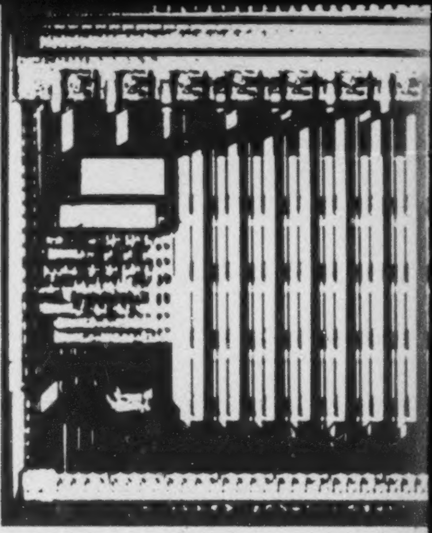
Source: Department of Defense Budget (Annually).
NOTE: Detail may not add to totals because of rounding.
E Estimate.

SPECIFICATIONS OF U.S. MILITARY AIRCRAFT ON ORDER OR IN PRODUCTION AS OF 1982

Primary Mission, DOD Designation, & Popular Name	Manufacturer	U.S. Military Service	Crew	Empty Weight (000's lbs)	Engines	Performance Typical for Primary Mission	Remarks
ATTACK							
A-6E Intruder	Grumman	USN/USMC	2	27	2 × P&W J52	Mach.8 sea level	Also EA-6A/B + KA–6D
A-7K Corsair	Vought	ANG	2	21	1 × All TF	Subsonic	Trainer; combat capable
AV-8B Harrier	MDD/Br.Aer.	USMC	1	13	1 × Br.Pegasus	Mach.9 +	Graphite/epoxy supercritical wing
A-10A Thunderbolt	Fairchild	USAF	1	22	2 × GE TF34	Max. speed 400kt.	Close air support
A-10B	Fairchild	USAF	2	23	2 × GE TF34	Max. speed 400kt	Combat ready trainer
BOMBERS							
B-1B	Rockwell	USAF	4	182	4 × GE F101	High subsonic penetration	Intercont'l range, unrefueled
ELECTRONIC WARFARE							
EA-6B Prowler	Grumman	USN/USMC	4	32	2 × P&W J52	513n.m. standoff radius	Tactical jamming system
FIGHTERS							
F-5E Tiger 2	Northrop	USAF/USN	1	10	2 × GE J85	Mach 1.6 class	More than 1,100 F-5E/Fs delivered
F-5F Tiger 2	Northrop	USAF/USN	2	11	2 × GE J85	Mach 1.5 class	2-seat trainer/fighter
F-14A Tomcat	Grumman	USN	2	40	2 × P&W TF30	Mach 2.3 class	Missile, gun fleet defense
F-15C Eagle	MDD	USAF	1	29	2 × P&W F100	Mach 2.5 class	Air superiority, defense, trainer; missiles, guns
F-16 Fighting Falcon	GD	USAF	1-2	25	1 × P&W F100	Mach 2 + class	Multirole fighter; fully fly-by-wire; missiles + EW
F/A-18 Hornet	MDD/Northrop	USN/USMC	1	23	2 × GE F404	Mach 1.8 +	Missiles, guns; also export
F-20 Tigershark	Northrop	Export	1	11	1 × GE F404	Mach 2 class	Multirole; adv. avionics
RECONNAISANCE							
TR-1/U-2	Lockheed	USAF	1	18	1 × P&W J75	Altitudes 70,000 ft +	High alt. tactical recon.
PATROL ANTI-SUBMARINE WARFARE							
P-3C Orion	Lockheed	USN	10	67	4 × All T56	14 + hr. mission duration	Torpedoes, missiles, sonobuoys, mines; also export
EARLY-WARNING							
E-2C Hawkeye	Grumman	USN	5	39	2 × All T56	6 hr. mission duration	AEW command + control; passive detection
E-3A AWACS	Boeing	USAF	17	188	4 × P&W TF33	Long range, subsonic	Surveillance radar, command, control
CARGO-TRANSPORT							
C-2A Greyhound	Grumman	USN	2	34	2 × All T56	Cruise 260kt; 1,560n.m. range	First Navy multi-year procurement contract
C/KC-130 Hercules	Lockheed	USAF, USN, Export	4	74-78	4 × All T56	Cruise 360mph; 2,046n.m. range	92-128 troops or 39-43 thsnd. lbs.
C-5A Galaxy	Lockheed	USAF	6	351	4 × GE TF39	Cruise 518mph; 3,250n.m. range	Global strategic logistics; 208,000 lb. cargo capacity
C-9B Skytrain 2	MDD	USN	5-7	65	2 × P&W JT8D	Cruise 570mph; 3,300n.m. range	90 pass. or 34,444 lb. cargo
C-12A/D Huron	Beech	Army/USAF	2	8	2 × PWC PT6A	Cruise 259kt. at 14,000ft.	10-place; pass. or cargo
KC-10A Extender	MDD	USAF	5	241	3 × GE CF6	600 + mph.	Tanker or cargo
UV-18A	DeHavilland	Army	2	7	2 × PWC PTC	160mph	20 passengers
TRAINING							
T-34C Turbo Mentor	Beech	USN	2	3	1 × PWC PT6A	Cruise 211kt. at 17,500ft	Simulates jet a/c; weapons
HELICOPTERS							
AH-1S Cobra	Bell-Textron	Army	2	6	1 × Lyc T53	Max 195 mph; 380 mi.	TOW w/mini gun
AH-64 Apache	Hughes Hel.	Army	2	11	2 × GE T700	Max 189 mph; 372 mi.	Attack helicopter
CH-53E Super Stallion	Sikorsky/UTC	USN	3	32	3 × GE T64	Max 196 mph; 710 mi.	55 passengers, aux. tanks
SH-2F Seasprite	Kaman	USN	3	7	2 × GE T58	Max 165 mph; 425 mi.	LAMPS Mk.I helicopter
TH-57A Sea Ranger	Bell-Textron	USN	2	2	1 × All 250	Max 140 mph; 400 mi.	Primary trainer
SH-60B Seahawk	Sikorsky/UTC	USN	3	14	2 × GE T700	Max 171 mph	ASW
UH-60A Black Hawk	Sikorsky/UTC	Army/USAF	3	11	2 × GE T700	Max 184 mph; 389 mi.	UTTAS

Source: Aerospace Industries Association, based on information from "Aviation Week & Space Technology Magazine."

CODE
Manufacturers: MDD = McDonnell Douglas; Br.Aer. = British Aerospace; GD = General Dynamics.
U.S. Military Service: USN = Navy; USMC = Marine Corps; USAF = Air Force; ANG = Air National Guard.
Engines: P&W = Pratt & Whitney; PWC = Pratt & Whitney of Canada; All = Detroit Diesel Allison Div. of General Motors; Lyc = Avco Lycoming.



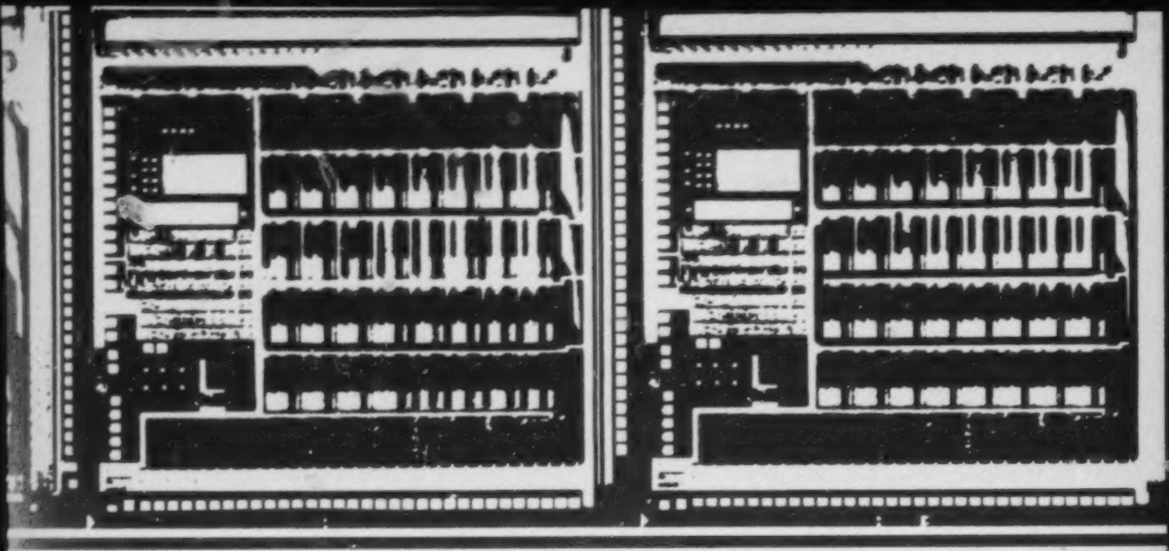
MISSILE PROGRAMS

Industry production of missile systems continued on the upward trend that began in 1978, with 1982 sales, as reported by the Bureau of the Census, reaching a record $5.4 billion. The figure compares with $4.7 billion in 1981. Backlog as of year-end 1982 was $6.1 billion, which compares with $6.5 billion at the end of the previous year.

When missile propulsion systems and funding for research, development, test and evaluation (RDT&E) are included as well, the 1982 sales figures, as calculated by AIA, totalled $8.3 billion, showing a 20 percent increase in current dollars, or a 13 percent increase in constant dollars, over the 1981 level. This upward trend is confirmed by Department of Defense budget data for Air Force and Army missile procurement outlays (Navy data are not available), which indicate missile outlays in FY 1982 amounting to $4.3 billion, 23 percent above the FY 1981 level of $3.5 billion. Air Force outlays, $3.1 billion, accounted for more than 70 percent of the total. Projections indicated sharp increases in later years, to $5.8 billion in FY 1983 (up 34 percent) and to $7.4 billion in FY 1984 (28 percent above the FY 1983 projection).

The largest missile program is the Air Force's 10-warhead Peacekeeper (MX) intercontinental ballistic missile. However, funding data is sketchy. The Congress imposed a stipulation that production of the Peacekeeper would not be funded until Congress approved a basing mode for the weapon, the subject of much deliberation for several years. In the spring of 1983, a Presidential commission proposed a 100-missile Peacekeeper program, to be operational in 1986, with the weapons deployed in hardened Minuteman silos. If the Congress approves such a program, funding for FY 1984 would be on the order of $2.9 billion, the Administration's request. Another important USAF strategic missile program was a plan to upgrade the Minuteman III ICBM by improved guidance and warhead systems; the improved Minuteman force would be initially operational in 1988. Another element of the commission's recommendations called for development of a small, single-warhead ICBM for service in the 1990s.

On the basis of procurement plans announced by the Department of De-



fense, missile programs with the largest FY 1983 dollar value included the Army's Patriot long-range antiaircraft missile system ($846 million); the Navy's Trident I submarine-launched ballistic missile ($663 million) and the Standard shipboard air defense system ($611 million); the Air Force's Air Launched Cruise Missile ($555 million) and Ground Launched Cruise Missile ($459 million); and the Army's Multiple Launch Rocket System ($444 million).

Other major missiles in production in 1982/83 were:

Army. The Pershing II ballistic missile, scheduled for deployment in Europe in 1983; the man-portable Stinger, a short-range antiaircraft missile; the TOW antitank missile, being produced for both the Army and the Marine Corps; the Laser Hellfire, a long-range, helicopter-launched antiarmor weapon; and the Copperhead laser-guided artillery projectile.

Navy. The HARM antiradiation weapon; the Harpoon antishipping missile; the Phoenix long-range air-to-air missile; the Laser Maverick air-to-surface missile planned for Marine Corps use; the Hawk mobile air defense system, operational with Navy, Army and NATO units; the Tomahawk long-range cruise missile; and several versions of the infrared-guided Sidewinder and the radar-guided Sparrow missiles carried aboard Navy and Air Force aircraft.

Air Force. In addition to the Peacekeeper and cruise missile programs, production missiles under USAF cognizance include the imaging infrared (IIR) Maverick air-to-surface missile and the Rapier, a short-range air defense weapon built in the United Kingdom for protection of U.S. air bases there.

Among missiles in research, development, test and evaluation (RDT&E) status were the Air Force AMRAAM (Advanced Medium Range Air-to-Air Missile), intended as a USAF/USN replacement for the Sparrow; the Air Force/Navy Tomahawk 2/MRASM (Medium Range Air-to-Surface Missile); the Air Force Wasp fighter-launched antiarmor missile; the Navy RAM (Rolling Airframe Missile) shipboard defense system; and the USAF's Prototype Miniature Air-Launched System (PMALS), an antisatellite interceptor to be launched from fighter aircraft.

MISSILE PROGRAM PROCUREMENT INCLUDING INITIAL SPARES[a]

Fiscal Years 1982, 1983 and 1984
(Millions of Dollars)

Agency, Type and Model	1982		1983[E]		1984[E]	
	No.	Cost	No.	Cost	No.	Cost
AIR FORCE						
ALCM	440	$597.1	330	$555.2	—	$ 104.2
AMRAAM[b]	—	—	—	—	—	62.6
GLCM	54	350.5	84	458.5	120	616.7
IR Maverick	200	222.2	900	248.9	2,600	349.8
Minuteman II/III	—	95.3	—	—	—	30.9
Peacekeeper (M-X)	—	—	—	—	27	2,867.3
Rapier	—	148.1	—	148.0	—	62.9
Target Drones	—	19.4	—	44.4	—	31.3
NAVY						
Harm[b]	236	$204.1	289	$254.3	515	$ 380.3
Harpoon	240	230.4	221	227.7	330	305.2
Hawk[e]	388	80.7	211	76.1	360	102.0
Laser Maverick	—	5.0	12	31.7	165	46.8
Phoenix	72	162.6	108	248.6	324	409.3
RAM	—	—	—	—	—	13.4
Sidewinder[b]	2,500	188.1	2,420	156.6	2,150	136.7
Sparrow[b]	1,495	356.8	1,786	341.4	1,700	345.3
Standard	1,095	452.2	1,150	611.1	1,190	624.0
Tomahawk	61	232.6	51	221.3	124	392.6
Trident I	72	876.8	62	662.8	52	587.2
ARMY						
Air Defense Targets	—	$ 9.7	—	$ 11.0	—	$ 12.5
Copperhead[c]	3,957	144.5	1,025	45.0	2,252	99.9
Laser Hellfire[d]	680	119.7	3,971	247.4	7,570	258.0
MLRS	2,496	203.3	23,640	444.4	36,000	551.6
Patriot	176	747.3	277	845.9	525	1,127.2
Pershing II	21	219.3	—	—	95	432.8
Roland	—	60.0	—	61.3	—	—
Stinger[f]	3,032	219.3	3,816	311.6	2,322	182.8
TOW[c]	12,674	151.8	13,000	162.0	20,200	214.7

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).
NOTE See Research and Development Chapter for missile program RDT&E authorization data.
E Estimate.
a Total Obligational Authority.
b Navy and Air Force funding.
c Army and Marine Corps funding.
d Army and Navy funding.
e Marine Corps funding.
f Army, Marine Corps and Air Force funding.

MAJOR MISSILES RESEARCH, DEVELOPMENT, PRODUCTION, OPERATION

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
AIR-TO-AIR					
AMRAAM	USAF/USN	D	Hughes	—	Hughes
Falcon-4F/G	USAF	O	Hughes	Thiokol	Hughes
Phoenix-54A	USN	O	Hughes	Hercules	Hughes
Phoenix-54C	USN	P	Hughes	Hercules	Hughes
Sidewinder-9H	USN	O	NASC/Raytheon	Bermite/Hercules	Ford Aero./Raytheon
Sidewinder-9J	USAF	O	Ford Aerospace	Hercules/Aerojet	Ford Aerospace
Sidewinder-9L	USN/USAF	P,O	NASC	Bermite/Hercules	Raytheon/Ford Aero.
Sidewinder-9M	USN/USAF	P	NASC	Thiokol/Hercules	Raytheon/Ford Aero.
Sidewinder-9N	USAF	O	Ford Aero.	—	Ford Aero.
Sidewinder-9P	USAF	O	Ford Aero.	—	Ford Aero.
Sparrow-7E	USN/USAF	P,O	Raytheon	Hercules/Aerojet	Raytheon
Sparrow-7F	USN/USAF	P,O	Raytheon/GD	Hercules	Raytheon/GD
Sparrow-7M	USN/USAF	P	Raytheon/GD	Hercules	Raytheon/GD
AIR-TO-SURFACE					
ALCM	USAF	P	Boeing	Williams International	McDonnell Douglas
HARM	USN/USAF	P	Texas Instr.	Thiokol	Texas Instr.
Harpoon*	USN	P,O	McDonnell Douglas	Teledyne CAE	TI/IBM/LSI/Northrop
GBU-15	USAF	P	Rockwell	—	Rockwell
Maverick-65A/B	USAF	P,O	Hughes	Thiokol/Aerojet	Hughes
Maverick-65D	USAF	D	Hughes	Thiokol/Aerojet	Hughes
Maverick-65E	USMC	D	Hughes	Thiokol/Aerojet	Hughes
Maverick-65F	USN	D	Hughes	Thiokol/Aerojet	Hughes
Shrike	USN/USAF	O	NWC/PMTC	Aerojet/Hercules	Texas Instruments
SRAM	USAF	O	Boeing	Lockheed	Singer
Standard ARM	USN/USAF	O	GD	NOSIH	GD
Tomahawk 2-MRASM	USN/USAF	D	General Dynamics	Teledyne CAE	McDonnell Douglas
Walleye 1	USN	O	Martin Marietta/Hughes	—	Martin Marietta/Hughes
Walleye 1ER	USN	R,D	NAC	—	NAC
Walleye 2	USN	O	NAC	—	NAC

*Also Surface-to-Surface

(Continued on next page)

MAJOR MISSILE PROGRAMS (Continued)

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
AIR TO SURFACE (Cont'd.)					
Walleye 2 (ER/DL)	USN	O	NAC	—	NAC
Wasp	USAF	D	Hughes	Atlantic Res./ Hercules	Hughes
ANTI-SUBMARINE					
Subroc	USN	O	Goodyear Aerospace	Thiokol	Singer
SURFACE-TO-AIR					
Chaparral	Army	O	Ford Aerospace	Hercules/ Bermite	GE/Raytheon
Improved Chaparral	Army	P,O	Ford Aerospace	—	Ford Aerospace
Improved Hawk	Army	P,O	Raytheon	Aerojet	Raytheon
Patriot	Army	P	Raytheon	Thiokol	Raytheon
RAM	USN	D	General Dynamics	Bermite/ Hercules	General Dynamics
Redeye	Army	O	General Dynamics	Atlantic Research	General Dynamics
Roland	Army	P	Hughes/ Boeing	Hercules	Hughes/ Boeing
Sea Sparrow	USN	P,O	Raytheon/ GD	Aerojet/ Hercules	Raytheon/ GD
Standard MR (SM-1)	USN	P,O	General Dynamics	Aerojet/ Hercules	General Dynamics
Standard MR (SM-2)	USN	P,O	General Dynamics	Aerojet/ Hercules	General Dynamics
Standard ER (SM-1)	USN	O	General Dynamics	Atlantic Research	General Dynamics
Standard ER (SM-2)	USN	P,O	General Dynamics	Atlantic Research	General Dynamics
Stinger	Army/ USMC	P,O	General Dynamics	Atlantic Research	General Dynamics
Tartar	USN	O	GD	Aerojet	GD
Terrier	USN	O	General Dynamics	Atlantic Research	General Dynamics
SURFACE-TO-SURFACE					
Minuteman 2	USAF	O	AFLC Hill AFB	Thiokol/ Aerojet/ Hercules	Rockwell Autonetics
Minuteman 3	USAF	O	AFLC Hill AFB	Thiokol/ Aerojet	Rockwell Autonetics

(Continued on next page)

MAJOR MISSILE PROGRAMS (Continued)

Program	Agency	Status	Systems Contractor	Propulsion Manufacturer	Guidance Manufacturer
SURFACE-TO-SURFACE (Cont'd.)					
Peacekeeper (MX)	USAF	R,D,	BMO/TRW/ Martin Marietta	Thiokol/Avco/ Aerojet/ Hercules/ Rocketdyne	Autonetics/ Northrop/ Honeywell
Polaris A3	USN	O	Lockheed MSC	Aerojet/ Hercules	GE/Hughes/ MIT/Raytheon
Poseidon C3	USN	O	Lockheed MSC	Thiokol/ Hercules	GE/MIT/ Raytheon/ Hughes
Tomahawk (SLCM)	USN	P	General Dynamics	Williams International	McDonnell Douglas
Tomahawk (GLCM)	USAF	D	General Dynamics	Williams International	McDonnell Douglas
Titan 2	USAF	O	AFLC Hill AFB	Aerojet	GM/Delco Electronics
Trident C4	USN	P,O,	Lockheed MSC	Hercules/ Thiokol	GE/Draper/ Raytheon/ Hughes
BATTLEFIELD SUPPORT AND ANTIARMOR					
Copperhead	Army	P	Martin Marietta	—	Martin Marietta
Dragon	Army	P,O	Raytheon/ Kollsman	MDD/ Hercules/ Raytheon	Raytheon
Hellfire	Army/ USMC	P	Rockwell	Thiokol	Martin Marietta
Lance	Army	O	Vought	RI	E-Systems/ Sys-Donner/Arma
MLRS	Army	P,O	Vought	Atlantic Res.	—
Pershing 1A	Army	O	Martin Marietta	Thiokol	Bendix
Pershing 2	Army	P	Martin Marietta	Hercules	Goodyear Aerospace
Shillelagh	Army	O	Ford Aerospace	Hercules	Ford Aerospace
TOW	Army/ USMC	P,O	Hughes	Hercules	Emerson Electric

Source: Aerospace Industries Association, based on information from "Aviation Week & Space Technology Magazine."
Status: R—Research; D—Development; P—Production; O—Operational.

Abbreviations:
AFB - Air Force Base
AFLC - Air Force Logistics Cmd.
BMO - Ballistic Missile Office
GD - General Dynamics
GE - General Electric
LSI - Lear Siegler
MDD - McDonnell Douglas
MIT - Massachusetts Institute of Technology
NAC - Naval Avionics Center
NASC - Naval Air Systems Command
NWC - Naval Weapons Center
PMTC - Pacific Missile Test Center
RI - Rockwell International
TI - Texas Instruments
USAF - United States Air Force
USMC - United States Marine Corps
USN - United States Navy

DEPARTMENT OF DEFENSE OUTLAYS FOR MISSILES

Fiscal Years 1960-1984
(Millions of Dollars)

Year	TOTAL MISSILE OUTLAYS	Procurement[a]	Research, Development, Test and Evaluation
1960	$5,086	$3,027	$2,059
1961	5,997	2,972	3,025
1962	6,219	3,442	2,777
1963	6,058	3,817	2,241
1964	5,929	3,577	2,352
1965	3,997	2,096	1,901
1966	3,870	2,069	1,801
1967	4,432	1,930	2,502
1968	4,741	2,219	2,522
1969	4,919	2,509	2,410
1970	5,108	2,912	2,196
1971	5,148	3,140	2,008
1972	5,166	3,009	2,157
1973	5,061	3,023	2,038
1974	5,141	2,981	2,160
1975	5,065	2,889	2,176
1976	4,591	2,296	2,295
Tr. Qtr.	922	402	520
1977	5,040	2,781	2,259
1978	NA	1,794	NA
1979	NA	2,084	NA
1980	NA	2,461	NA
1981	NA	3,513	NA
1982	NA	4,338	NA
1983[E]	NA	5,795	NA
1984[E]	NA	7,427	NA

Source: Department of Defense Budget (Annually).

[a] Effective 1978, for Army and Air Force only; Navy missile procurement outlays data no longer available as separate budget item.

E Estimate.

NA Not Available.

DEPARTMENT OF DEFENSE OUTLAYS FOR MISSILE PROCUREMENT[a]

By Agency
Fiscal Years 1960-1984
(Millions of Dollars)

Year	TOTAL MISSILE PROCUREMENT	Air Force	Navy	Army
1960	$3,027	$2,021	$423	$ 583
1961	2,972	1,922	493	557
1962	3,442	2,385	593	464
1963	3,817	2,676	718	423
1964	3,577	2,100	981	496
1965	2,096	1,320	522	254
1966	2,069	1,313	512	244
1967	1,930	1,278	432	220
1968	2,219	1,388	436	395
1969	2,509	1,382	534	593
1970	2,912	1,467	702	743
1971	3,140	1,497	791	852
1972	3,009	1,334	831	844
1973	3,023	1,454	628	941
1974	2,981	1,537	541	903
1975	2,889	1,602	615	672
1976	2,296	1,549	584	163
Tr. Qtr.	402	347	148	(93)
1977	2,781	1,502	905	374
1978	1,794	1,376	NA	418
1979	2,084	1,537	NA	547
1980	2,461	1,810	NA	651
1981	3,513	2,367	NA	1,146
1982	4,338	3,069	NA	1,269
1983[E]	5,795	3,928	NA	1,867
1984[E]	7,427	5,064	NA	2,364

Source: Department of Defense Budget (Annually).
NOTE: Detail may not add to totals because of rounding.
a Effective 1978, for Army and Air Force only; Navy missile procurement outlays data no longer available as separate budget item.
E Estimate.
NA Not Available.

SALES AND BACKLOG MISSILE SYSTEMS AND PARTS

Calendar Years 1968-1982
(Millions of Dollars)

Year	Missile Systems and Parts[a]	
	Net Sales	Backlog December 31
CURRENT DOLLARS		
1968	$2,812	$3,218
1969	2,676	2,511
1970	2,826	2,721
1971	2,641	3,344
1972	3,335	3,642
1973	3,391	3,868
1974	3,454	4,473
1975	3,548	4,580
1976	3,237	4,379
1977	3,118	4,541
1978	3,264[b]	4,581
1979	3,706	4,916
1980	3,971	5,558[r]
1981[r]	4,662	6,529
1982	5,400	6,137
CONSTANT DOLLARS (1972 = 100)[c]		
1968	$3,407	$3,899
1969	3,083	2,893
1970	3,090	2,975
1971	2,751	3,483
1972	3,335	3,642
1973[r]	3,207	3,658
1974[r]	3,001	3,887
1975[r]	2,821	3,641
1976[r]	2,446	3,309
1977[r]	2,226	3,242
1978[r]	2,170	3,045
1979[r]	2,268	3,008
1980[r]	2,223	3,111
1981[r]	2,385	3,339
1982	2,606	2,961

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] Prior to 1980, includes space vehicle systems and parts sold to other than U.S. Government customers.

[b] AIA estimate based on MQ37D.

[c] Based on GNP implicit price deflator; detail may not add to totals because of rounding.

[r] Revised.

SALES AND BACKLOG ENGINES AND PROPULSION UNITS FOR MISSILES AND SPACE VEHICLES

Calendar Years 1968-1982
(Millions of Dollars)

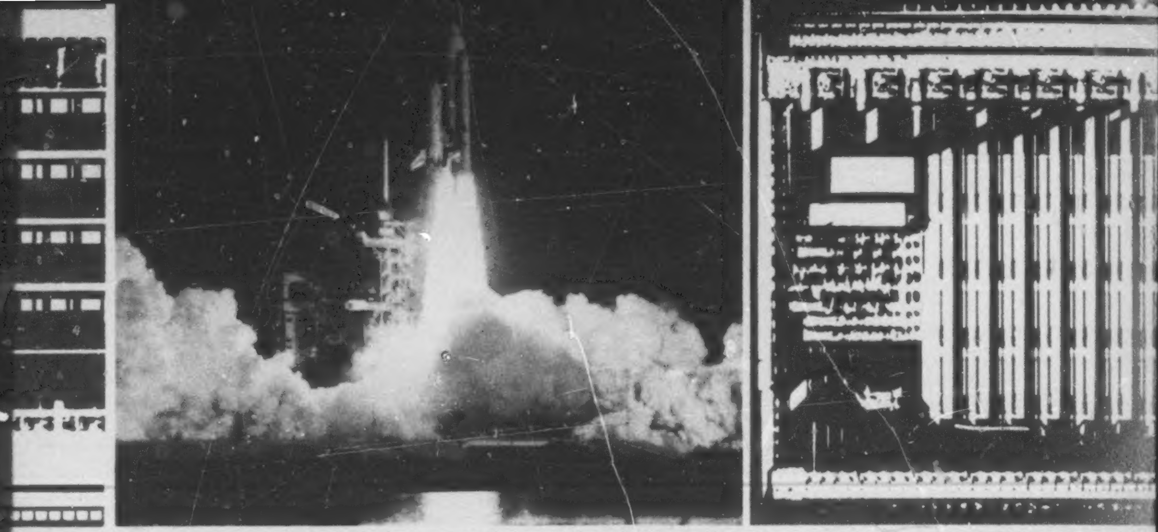
Year	Net Sales			Backlog, December 31		
	TOTAL	Military[a]	Non-Military	TOTAL	Military[a]	Non-Military
CURRENT DOLLARS						
1968	$ 907	$676	$231	$535	$406	$129
1969	702	667	35	497	485	12
1970	640	398	242	617	610	7
1971	605	596	9	520	513	7
1972	607	596	11	671	659	12
1973	627	607	20	625	615	10
1974	649	633	16	678	662	16
1975	643	626	17	531	517	14
1976	641	621	20	673	659	14
1977	787	757	30	613	595	18
1978	792	760	32	788	754	34
1979	952	915	37	1,024	980	44
1980	939	661	278	1,284[r]	871[r]	413[r]
1981[r]	1,204	786	418	1,344	800	544
1982	1,576	876	700	1,879	1,049	830
CONSTANT DOLLARS (1972 = 100)[b]						
1968	$1,099	$819	$280	$648	$492	$156
1969	809	769	40	573	559	14
1970	700	435	265	675	667	8
1971	630	621	9	542	534	7
1972	607	596	11	671	659	12
1973[r]	592	573	19	591	582	9
1974[r]	563	550	14	589	575	14
1975[r]	511	498	14	422	411	11
1976[r]	484	469	15	509	498	11
1977[r]	562	541	21	438	425	13
1978[r]	527	505	21	524	501	23
1979[r]	583	560	23	627	600	27
1980[r]	526	370	156	719	488	231
1981[r]	615	402	214	687	409	278
1982	761	423	338	907	506	401

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] Prior to 1980, includes figures for nonmilitary U.S. Government customers.

[b] Based on GNP implicit price deflator; detail may not add to totals because of rounding.

[r] Revised.



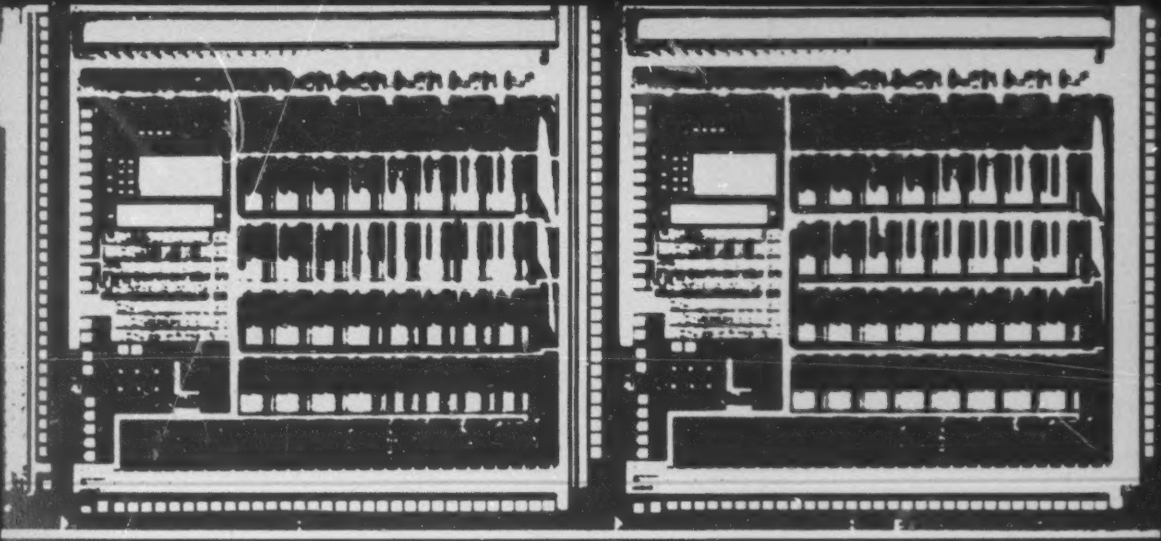
SPACE PROGRAMS

United States activity in space continued on the upward trend in 1982, according to indications in federal budget data. Space budget authority for the Department of Defense, NASA, the National Oceanic and Atmospheric Administration and other government agencies topped $12 billion in Fiscal Year 1982 and increased at an even faster rate—more than 23 percent—in FY 1983 to $14.8 billion.

The increased activity is due for the most part to the rapidly growing military space program. In FY 1982, budget authority for Department of Defense space programs topped NASA's for the first time since 1960; DoD received $6.4 billion to NASA's $5.5 billion. In inflation-adjusted constant dollars, NASA's budget authority has increased only nine percent over the FY 1981-83 span; DoD authority increased more than 56 percent over the same period. For FY 1984, the Administration requested $9.2 billion for DoD, $7.1 billion for NASA. This trend—military programs predominating among federal government space activities—is expected to continue in immediate future years as DoD begins Space Shuttle operations and simultaneously expands its space communications, intelligence gathering, navigation, meteorological, geodesy and ground-based space surveillance programs.

Although its funding does not approach DoD/NASA levels, the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) is becoming a more significant government space entity. NOAA has operated a weather/environmental satellite system for years and in 1983 it also took over NASA's Landsat Earth resources monitoring satellite system. Total Department of Commerce space activities funding is increasing accordingly, from $87 million in FY 1981 to $125 million in 1982, and then to $151 million for FY 1983.

The U.S. conducted 18 space launches in calendar year 1982, 15 of them by expendable boosters and three flights of the Space Shuttle; the total was the same as in the previous year. Three of the launches boosted dual payloads, so there were 21 U.S. payloads in all. Worldwide space launches numbered 122, one fewer than in 1981. The Soviet Union made 101 of them, four more than in the previous year. The remaining three were flown—one each—by



Japan, India and the People's Republic of China. The all-time total of successful launches reached 2,387, of which 1,537—64 percent—were made by the Soviet Union; the U.S. total at year-end 1982 was 792.

The 21 U.S. payloads sent into orbit included the three Space Shuttle launches, seven DoD space systems, one NASA satellite and 10 satellites launched by NASA for commercial or foreign government customers; also included were two experimental packages carried aboard the Space Shuttle during two pre-operational test flights. The lone NASA spacecraft was Landsat 4, most advanced of the Earth resources survey satellite family; it was declared operational and turned over to NOAA in January 1983.

NASA-launched payloads for other customers included Satcom 4 and Satcom 5, part of the RCA commercial communications satellite network; Westar 4 and Westar 5, new units of the communications satellite system operated by Western Union; two Intelsat V spacecraft launched for the International Telecommunications Satellite Organization; India's Insat 1A direct broadcast communications satellite, lost after successful launch due to lack of attitude control propellant; Anik D-1 and Anik C-3, spacecraft of the Telesat Canada domestic satellite system; and SBS-3, third of the Satellite Business System series. Anik C-3 and SBS-3 were the first commercial payloads carried by the Space Shuttle.

With the Shuttle now operational, NASA's major programs in development status during 1982/83 included the Space Telescope, an advanced astronomical observatory scheduled for 1986 launch; Galileo, a Jupiter orbiter/probe to be launced in 1986; the Solar Optical Telescope, to be used aboard the Shuttle Orbiter beginning in 1987; the Advanced Communications Technology Satellite, designed to allow use of a new frequency band; and the Venus Radar Mapper, to be launched late in the decade. Among unclassified military programs were the Milstar extremely high frequency communications satellite; the DSCS-III advanced communications network; the Navstar Global Positioning System, to be operational in 1985; and an advanced series in the Defense Meteorological Satellite Program known as Block 5D-2, to be fully operational in 1985.

U.S. SPACECRAFT RECORD[a]

Calendar Years 1957-1982

Year	Earth Orbit[b]		Earth Escape[b]		Year	Earth Orbit[b]		Earth Escape[b]	
	Success	Failure	Success	Failure		Success	Failure	Success	Failure
1957	0	1	0	0	1970	36	1	3	0
1958	5	8	0	4	1971	45	2	8	1
1959	9	9	1	2	1972	33	2	8	0
1960	16	12	1	2	1973	23	2	3	0
1961	35	12	0	2	1974	27	2	1	0
1962	55	12	4	1	1975	30	4	4	0
1963	62	11	0	0	1976	33	0	1	0
1964	69	8	4	0	1977	27	2	2	0
1965	93	7	4	1	1978	34	2	7	0
1966	94	12	7	1[c]	1979	18	0	0	0
1967	78	4	10	0	1980	16	4	0	0
1968	61	15	3	0	1981	20	1	0	0
1969	58	1	8	1	1982	21	0	0	0
					TOTAL	998	134	79	15

Source: NASA, "Aeronautics and Space Report of the President," (Annually).

[a] Payloads, rather than launchings; some launches account for multiple spacecraft. Includes spacecraft from cooperating countries launched by U.S. launch vehicles.

[b] The criterion of success or failure used is attainment of earth orbit or earth escape rather than judgment of mission success. "Escape" flights include all that were intended to go at least an altitude equal to lunar distance from the earth.

[c] This earth-escape failure did attain earth orbit and therefore is included in the earth-orbit success totals.

WORLDWIDE SPACE LAUNCHINGS WHICH ATTAINED EARTH ORBIT OR BEYOND[a]

Calendar Years 1957-1982

Country	Total 1957-1982	1978	1979	1980	1981	1982
TOTAL	2,387	124	106	105	123	122
U.S.S.R.	1,537	88	87	89	97	101
United States	792	32	16	13	18	18
Japan	21	3	2	2	3	1
People's Republic of China	10	1	—	—	1	1
European Space Agency	3	—	1	—	2	—
India	4	—	—	1	2	1[c]
Other[b]	20	—	—	—	—	—

Source: National Aeronautics and Space Administration, "Aeronautics and Space Report of the President," (Annually).

[a] Number of launchings rather than spacecraft; some launches orbited multiple spacecraft.

[b] Includes 10 by France, 8 by Italy (5 were U.S. spacecraft), 1 by Australia, and 1 by the United Kingdom.

[c] Foreign launching of U.S. spacecraft.

U.S. MAJOR LAUNCH RECORD

Calendar Year 1982

Launch Date Spacecraft, and Launch Vehicle	Objectives and Remarks
Jan. 16 RCA-Satcom 4 Thor-Delta	COMMUNICATIONS SATELLITE: to place spacecraft in stationary geosynchronous orbit to provide television, voice channels, and high-speed data transmission to Alaska, Hawaii, and contiguous U.S.; to provide video programming to CATV (cable television) systems throughout U.S. Fifth in a series; joined four on-orbit RCA commercial communications satellites.
Jan. 21 Defense Titan IIIB	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced.
Feb. 26 Westar 4 Thor-Delta	COMMUNICATIONS SATELLITE: to provide transmission of television, voice, and facsimile data throughout the contiguous U.S., Alaska, Hawaii, Puerto Rico, and the Virgin Islands. Spacecraft carries 24 color TV channels, twice previous Westar spacecraft; design life of ten years. First in a series of second-generation satellites launched by NASA for Western Union Telegraph Company.
Mar. 5 Intelsat V F-4 Atlas-Centaur	COMMUNICATIONS SATELLITE: to provide 12,000 voice circuits plus two color television channels simultaneously; double the capacity of Intelsat IVA series. Fourth in a series of nine satellites; launched by NASA for 106-member-nation International Telecommunications Satellite Organization (INTELSAT). Positioned in orbit above Indian Ocean to provide communication services between Europe, the Middle East and Far East.
Mar. 6 Defense Titan IIIC	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
Mar. 22 Columbia (STS-3) Space Shuttle	Third of four planned flight tests of Space Transportation System. Objectives were to demonstrate ascent, on-orbit, and entry performance under conditions more demanding than STS-2; extend orbital flight duration; conduct long duration thermal soak tests; and conduct scientific and applications research with attached Office of Space Science payload (OSS-1). Put through extensive thermal testing in various attitudes. OSS-1 returned considerable data. Remote Manipulator System (RMS) moved plasma experiment outside Shuttle cargo bay. Flight extended one day because of heavy rains flooding normally-dry lakebed runways at Edwards AFB; alternate landing site used at Northrop Strip, White Sands, NM. Returned to Kennedy Space Center to begin processing for STS-4 mission.

(Continued on next page)

U.S. MAJOR LAUNCH RECORD 1982 (Continued)

Launch Date Spacecraft, and Launch Vehicle	Objectives and Remarks
Apr. 10 Insat 1A Thor-Delta	COMMUNICATIONS SATELLITE: to provide nationwide direct broadcasting to community TV receivers located in rural areas of India. First in a series of communications satellites launched by NASA for the India Department of Space (DOS). Spacecraft experienced operational problems, and failed in Sept. because of lack of attitude control system propellant.
May 11 Defense Titan IIID	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
Jun. 9 Westar 5 Thor-Delta	COMMUNICATIONS SATELLITE: to relay voice, data, video, and facsimile communications to the contiguous U.S., Hawaii, Alaska, Puerto Rico, and the Virgin Islands. Spacecraft carries 24 color TV channels; design life is ten years. Second in a series of second-generation satellites, launched by NASA for Western Union Telegraph Company; replaced Westar 2.
Jun. 27 Columbia (STS-4) Space Shuttle	Last flight of the Orbital Test Flight program, with objectives to demonstrate ascent, on-orbit, and entry performance under conditions more demanding than STS-3, to conduct long duration thermal soak tests, and to conduct scientific and applications research with attached payloads. Scientific payload returned valuable data for subsequent evaluation. Shuttle also carried DOD payload. President Reagan at 4th of July landing ceremonies declared Space Transportation System operational. Shuttle solid rocket boosters sank in Atlantic Ocean and not recovered for reuse. Columbia returned to Kennedy Space Center to begin processing for STS-5 mission.
Jul. 16 Landsat 4 Thor-Delta	EARTH OBSERVATION SATELLITE: to acquire multispectral imagery on a global basis sufficient to improve remote sensing interpretive techniques and testing of new Thematic Mapper (TM) instrument for a period of at least one year. Launched into circular near-polar sun-synchronous orbit allowing spacecraft to photograph entire globe during a 16-day period, in 185 km swaths. Fourth experimental earth resources satellite; Landsat 1 launched in 1972, Landsat 2 in 1975, and Landsat 3 in 1978.
Aug. 26 Anik D-1 (Telesat-G) Thor-Delta	COMMUNICATIONS SATELLITE: to provide communications coverage over Canada. Launched by NASA for Telesat Canada; to be in-orbit replacement for three aging Anik-A (1972, 1973, 1975) and Anik-B (1978) satellites.

(Continued on next page)

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U.S. MAJOR LAUNCH RECORD 1982 (Continued)

Launch Date Spacecraft, and Launch Vehicle	Objectives and Remarks
Sep. 28 Intelsat V F-5 Atlas-Centaur	COMMUNICATIONS SATELLITE: to provide 12,000 voice circuits plus two color television channels simultaneously. Maritime Communications Services (MCS) package for the Maritime Satellite Organization (INMARSAT) to provide ship/shore/ship communication. Fifth in a series of nine satellites, launched by NASA for 106-member-nation International Telecommunication Satellite Organization (INTELSAT). Positioned over Indian Ocean.
Oct. 27 RCA-Satcom 5 Thor-Delta	COMMUNICATIONS SATELLITE: to provide television, voice channels, and high-speed data transmission to Alaska, Hawaii, and contiguous U.S.; to provide video programming to CATV (cable television) systems throughout U.S. Launched by NASA for RCA; joins four other satellites, Satcoms I, II, III-R and IV in orbit. Positioned over Pacific Ocean.
Oct. 30 Defense (2 Satellites) Titan 34D	DOD SATELLITES: to place Defense Satellite Communications Systems II and III spacecraft in successful orbit. First use of Titan 34D launch vehicle and Inertial Upper Stage (IUS) to launch spacecraft. First in a series of uprated communications satellites. Still in orbit.
Nov. 11 Columbia (STS-5) SBS-3 (Nov. 11) Anik C 3 (Telesat 5) (Nov. 12) Space Shuttle	First operational flight of Space Transportation System, to demonstrate initial operational capability by launching two commercial communications satellites, and demonstrate extra-vehicular activity (EVA) capability. Piloted by two astronauts and two mission specialists. Two satellites successfully launched from payload cargo bay. EVA canceled when problems developed with both space suits. Landed on concrete runway at Edwards AFB. Returned to Kennedy Space Center for major overhaul and refurbishment for next scheduled flight in Fall 1983 (STS-9). SATELLITES: SBS-3 is third in a series to provide integrated, all-digital, interference-free transmission of telephone, computer, electronic mail, and video teleconferencing to Satellite Business System (SBS) business clients. First successful commercial launch from cargo payload bay of Space Transportation System. Anik C 3 is second in a series launched by NASA for Telesat Canada.
Nov. 17 Defense Titan IIID	DOD SATELLITE: to develop spaceflight techniques and technology. Spacecraft not announced. Still in orbit.
Dec. 21 Defense Atlas E	DOD SATELLITE: to successfully launch Defense Meteorological Satellite Program block 5D spacecraft, an observation satellite with same basic configuration as NOAA 7. Still in orbit.

Source: NASA, "Aeronautics and Space Report of The President" (Annually) and NASA Historian's Office.
NOTE: Includes government and commercial payloads carried by all rocket vehicles larger than sounding rockets launched into orbit by NASA and DOD.

U.S. SPACE LAUNCH VEHICLES AS OF 1982

Vehicle and Initial Launch & First Launch of this Modification	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Geo-synch.-Transfer Orbit	Circular Sun-Synch. Orbit
Scout (1960; 1979)	1. Algol IIIA* 2. Castor IIA* 3. Antares IIIA* 4. Altair IIIA*	431.1 285.2 83.1 25.6	255 205[b]	—	155[b]
Delta 2900 Series (Thor-Delta) (1960; 1973)	1. Thor plus 9 TX 354-5* 2. Delta 3. TE 364-4*	912.0 147[c] 44.2 65.8	2,000 1,410[b]	705	1,250[b]
Delta 3900 Series (Thor-Delta)[d] (1960; 1982)	1. Thor plus 9 TX 526-2* 2. Delta 3. TE 364-4*	912.0 375[c] 44.2 65.8	3,045 2,180[b]	1,275	2,135[b]
Atlas E/F- TE 364-4 (1967; 1972)	1. Atlas booster & sustainer 2. TE 364-4*	1,722.0 65.8	2,090[b,e]	—	1,500[b]
Atlas-Centaur (1962)	1. Atlas booster & sustainer 2. Centaur	1,913.0 146.0	5,680	2,045	—

Vehicle and Launch Date	Stages	Thrust (Kilo-newtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Direct Geo-synch Orbit	Sun-Synch. Transfer Orbit
Titan IIIB-Agena (1966)	1. LR-87 2. LR-91 3. Agena	2,341.0 455.1 71.2	3,600[b]	—	3,060[b]
Titan IIIC (1965)	1. Two-segment 3.05-m. dia.* 2. LR-87 3. LR-91 4. Transtage	10,675.2 2,341.0 455.0 69.8	13,245	1,610[b]	—
Titan IIID (1971)	Same as Titan IIIC without Transtage		11,020[b]	—	9,750[b]

(Continued on next page)

U.S. SPACE LAUNCH VEHICLES AS OF 1982 (Continued)

Vehicle and Launch Date	Stages	Thrust (Kilonewtons)	Maximum Payload (Kg)[a]		
			185-Km Orbit	Direct Geo.-Synch. Orbit	Sun Synch. Transfer Orbit
Titan III(34)D (*f*)	1. Two 5½-segment 3.05-m. dia* 2. LR-87 3. LR-91	11,564.8 2,366.3 449.3	12,520[b]	—	11,340[b]
Titan III(34)D/IUS (1982)	Same as Titan III(34)D plus: 4. IUS 1st stage* 5. IUS 2nd stage*	 275.8 115.7	14,920	1,850[b]	—
Titan III(34)D Transtage (*g*)	Same as Titan III(34)D plus: 4. Transtage	 69.8	14,920	1,855[b]	—
Space Shuttle (reusable) (1981)	1. Orbiter; 3 main engines (SSMEs) fire in parallel with SRBs 2. Two solid-fueled rocket boosters (SRBs) mounted on external tank (ET) fire in parallel with SSMEs	1,670[c] 11,790[c]	29,500 in full performance configuration (280-420 km orbit)		

Source: NASA, "Aeronautics and Space Report of the President" (Annually) and NASA Historian's office.

* Solid propellant, all others are liquid.

a Due east launch except as indicated.

b Polar launch.

c Each.

d Maximum performance based on 3920 and 3920/PAM (payload assist module) configurations.

e With dual TE 364-4.

f Initial operational capability in December 1981; launch to be scheduled as needed.

g Initial operational capability in December 1982, launch to be scheduled as needed.

U.S. MANNED SPACE FLIGHT LOG

Calendar Years 1961-1982

Launch Date	Spacecraft and Crew	Flight Time (days:hrs:min)	Highlights
1961			
May 5	MR-3 (Shepard)	0:00:15	First U.S. flight; suborbital.
July 21	MR-4 (Grissom)	0:00:16	Suborbital; capsule sank after landing; astronaut safe.
1962			
Feb. 20	MA-6 (Glenn)	0:04-55	First American to orbit.
May 24	MA-7 (Carpenter)	0:04:56	Landed 400 km. beyond target.
Oct. 3	MA-8 (Schirra)	0:09:13	Landed 8 km. from target.
1963			
May 15	MA-9 (Cooper)	1:10:20	First U.S. flight exceeding 24 h.
1965			
Mar. 23	Gemini 3 (Grissom, Young)	0:04:53	First U.S. 2-man flight; first manual maneuvers in orbit.
June 3	Gemini 4 (McDivitt, White)	4:01:56	21-min extravehicular activity (White).
Aug. 21	Gemini 5 (Cooper, Conrad)	7:22:55	Longest-duration manned flight to date.
Dec. 4	Gemini 7 (Borman, Lovell)	13:18:25	Longest-duration manned flight to date.
Dec. 15	Gemini 6-A (Schirra, Stafford)	1:01:51	Rendezvous within 30 cm of Gemini 7.
1966			
Mar. 16	Gemini 8 (Armstrong, Scott)	0:10:41	First docking of two orbiting spacecraft (Gemini 8 with Agena target rocket).
June 3	Gemini 9-A (Stafford, Cernan)	3:00:21	Extravehicular activity, rendezvous.
July 18	Gemini 10 (Young, Collins)	2:22:47	First dual rendezvous (Gemini 10 with Agena 10, then Agena 8).
Sept. 12	Gemini 11 (Conrad, Gordon)	2:23:17	First initial-orbit docking; first tethered flight; highest earth-orbit altitude (1372 km).
Nov. 11	Gemini 12 (Lovell, Aldrin)	3:22:35	Longest extravehicular activity to date (Aldrin, 5 hr 37 min).
1968			
Oct. 11	Apollo 7 (Schirra, Eisele, Cunningham)	10:20:09	First U.S. 3-man mission.
Dec. 21	Apollo 8 (Borman, Lovell, Anders)	6:03:01	First manned orbit(s) of moon; first manned departure from earth's sphere of influence; highest speed ever attained in manned flight.

(Continued on next page)

U.S. MANNED SPACE FLIGHT LOG (Continued)

Calendar Years 1961-1982

Launch Date	Spacecraft and Crew	Flight Time (days:hrs:min)	Highlights
1969			
Mar. 3	Apollo 9 (McDivitt, Scott, Schweickart)	10:01:01	Successfully simulated in earth orbit operation of Lunar Module to landing and take off from lunar surface and rejoining with Command Module.
May 18	Apollo 10 (Stafford, Young, Cernan)	8:00:03	Successfully demonstrated complete system including Lunar Module descent to 14,300 m. from lunar surface.
July 16	Apollo 11 (Armstrong, Collins, Aldrin)	8:03:09	First manned landing on lunar surface and safe return to earth. First return of rock and soil samples to earth, and manned deployment of experiments on lunar surface.
Nov. 14	Apollo 12 (Conrad, Gordon, Bean)	10:04:36	Second manned lunar landing. Explored surface of moon and retrieved parts of Surveyor 3 spacecraft, which landed in Ocean of Storms Apr. 19, 1967.
1970			
April 11	Apollo 13 (Lovell, Haise, Swigert)	5:22:55	Mission aborted; explosion in Service Module. Ship circled moon, with crew using LM as "lifeboat" until just before reentry.
1971			
Jan. 31	Apollo 14 (Shepard, Roosa, Mitchell)	9:00:02	Third manned lunar landing. Mission demonstrated pinpoint landing capability and continued manned exploration.
July 26	Apollo 15 (Scott, Worden, Irwin)	12:07:12	Fourth manned lunar landing and first Apollo "J" series mission; carried Lunar Roving Vehicle. Worden's in flight EVA of 38 min 12 sec performed during return trip.
1972			
April 16	Apollo 16 (Young, Duke, Mattingly)	11:01:51	Fifth manned lunar landing, with Lunar Roving Vehicle.
Dec. 7	Apollo 17 (Cernan, Schmitt, Evans)	12:13:52	Sixth and final Apollo manned lunar landing, again with roving vehicle.
1973			
May 25	Skylab 2 (Conrad, Kerwin, Weitz)	28:00:50	Docked with Skylab 1 for 28 days. Repaired damaged station.

(Continued on next page)

U.S. MANNED SPACE FLIGHT LOG (Continued)

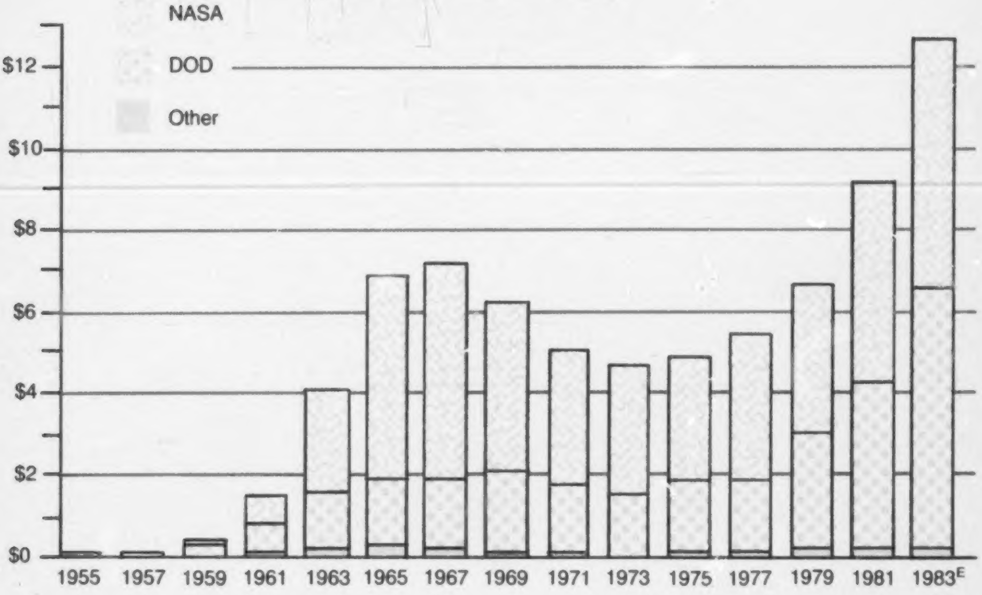
Calendar Years 1961-1982

Launch Date	Spacecraft and Crew	Flight Time (days:hrs:min)	Highlights
July 28	Skylab 3 (Bean, Lousma, Garriott)	59:11:09	Docked with Skylab 1 for more than 59 days.
Nov 16	Skylab 4 (Carr, Gibson, Pogue)	84:01:16	Docked with Skylab 1 in long-duration mission; last of Skylab program.
1975			
July 15	Apollo (ASTP) (Stafford, Slayton, Brand)	9:01:28	Docked with Soyuz 19 in joint experiments of Apollo Soyuz Test Program (ASTP) mission.
1981			
Apr. 12	STS-1 (Orbiter Columbia) (Young, Crippen)	2:06:21	First flight of Space Shuttle, tested spacecraft in orbit. First landing of airplanelike craft from orbit for reuse.
Nov. 12	STS-2 (Orbiter Columbia) (Engle, Truly)	2:06:13	Second flight of Space Shuttle, first scientific payload (OSTA 1). Tested Remote Manipulator Arm. Returned for reuse.
1982			
Mar. 22	STS-3 (Orbiter Columbia) (Lousma, Fullerton)	8:04:49	Third flight of Space Shuttle, second scientific payload (OSS-1). Second test of Remote Manipulator Arm. Flight extended one day because of flooding at primary landing site; alternate landing site used. Returned for reuse.
Jun. 27	STS-4 (Orbiter Columbia) (Mattingly, Hartsfield)	7:01:09	Fourth flight of Space Shuttle, first DOD payload, with additiional scientific payloads. Returned 4th of July. Completed orbital flight testing program. Returned for reuse.
Nov. 11	STS-5 (Orbiter Columbia) (Brand, Overmyer, Allen, Lenoir)	5:02:14	Fifth flight of Space Shuttle, first operational flight. Launched two commercial satellites (SBS 3 and Anik C-3). First flight with four crewmembers. EVA test canceled when spacesuits malfunctioned. Next scheduled flight of Columbia for Fall 1983 (STS-9), with Spacelab 1 as payload.

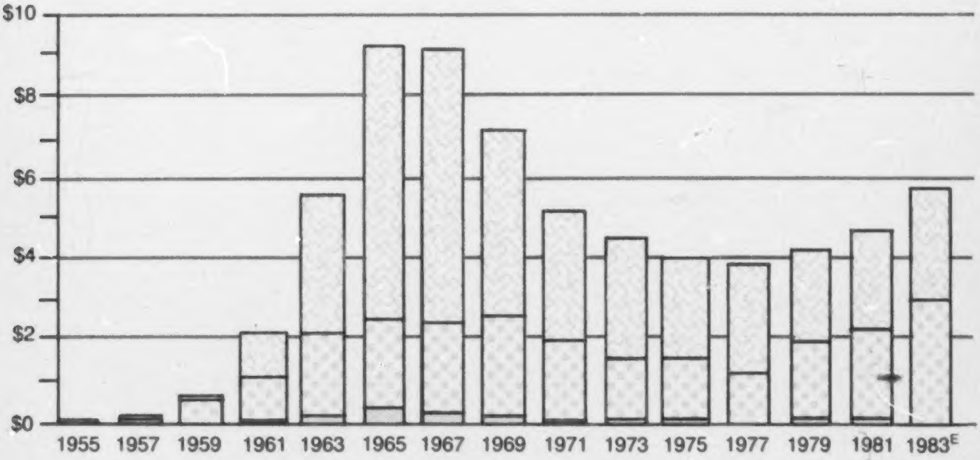
Source: NASA, "Aeronautics and Space Report of The President" (Annually) and NASA Historian's Office.

FEDERAL OUTLAYS FOR SPACE ACTIVITIES

(Billions of Current Dollars)



(Billions of Constant Dollars — 1972 = 100)



Source: Aerospace Industries Association

FEDERAL SPACE ACTIVITIES OUTLAYS

Fiscal Years 1955-1983[a]
(Millions of Current Dollars)

Year	TOTAL	NASA[b]	DOD	Energy	Commerce	Other[c]
1955	$ 75.3	$ 73.8	$ 1.5	$ —	$ —	$ —
1956	100.1	71.1	16.5	6.3	—	6.2
1957	150.1	76.1	47.5	19.2	—	7.3
1958	248.9	89.2	135.5	20.2	—	4.0
1959	433.9	58.8	341.0	32.6	—	1.5
1960	888.4	329.2	518.1	41.1	—	—
1961	1,467.9	693.6	710.0	64.3	—	—
1962	2,386.6	1,225.9	1,028.8	130.0	1.0	0.9
1963	4,078.6	2,516.8	1,367.5	181.0	12.2	1.1
1964	5,929.8	4,131.3	1,563.5	220.1	12.3	2.6
1965	6,886.1	5,035.0	1,591.8	232.2	24.1	3.0
1966	7,718.5	5,857.9	1,637.4	188.3	28.1	6.8
1967	7,237.3	5,336.7	1,673.1	183.6	38.6	5.3
1968	6,666.7	4,595.3	1,890.2	146.5	29.0	5.7
1969	6,326.1	4,078.0	2,095.0	117.5	31.0	4.6
1970	5,453.2	3,565.2	1,756.1	102.6	24.0	5.3
1971	4,999.0	3,171.0	1,693.0	97.3	29.8	7.9
1972	4,771.8	3,194.9	1,470.0	59.6	37.4	9.9
1973	4,719.4	3,069.4	1,557.0	51.1	29.4	12.5
1974	4,853.9	2,960.4	1,777.0	38.8	64.0	13.7
1975	4,890.8	2,950.9	1,831.1	34.3	63.6	10.9
1976	5,313.9	3,336.3	1,864.4	25.7	71.1	16.4
Tr. Qtr.	1,361.0	868.6	458.1	7.5	23.2	3.6
1977	5,559.1	3,599.5	1,832.7	22.2	86.9	17.8
1978	6,188.2	3,582.4	2,457.0	28.6	100.7	19.5
1979	6,808.3	3,743.9	2,891.8	54.7	97.4	20.5
1980	7,667.7	4,340.1	3,162.3	48.8	88.7	27.8
1981	9,165.5	4,877.1	4,130.5	46.9	81.0	30.0
1982[E]	10,589.5	5,282.4	5,112.8	43.1	122.0	29.2
1983[E]	12,750.9	6,061.6	6,477.1	31.1	147.0	34.1

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Detail may not add to totals because of rounding.
[a] FY 1984 and revised FY 1983 estimates not available at time of publication.
[b] Excludes amounts for air transportation.
[c] Departments of Interior and Agriculture, and The National Science Foundation.
[E] Estimate.

FEDERAL SPACE ACTIVITIES OUTLAYS IN CONSTANT DOLLARS

Fiscal Years 1955-1983[a]
(Millions of Constant Dollars, 1972 = 100[b])

Year	TOTAL	NASA[c]	DOD	Energy	Commerce	Other[d]
1955	$ 122.9	$ 120.5	$ 2.4	$ —	$ —	$ —
1956	159.0	113.0	26.2	10.0	—	9.9
1957	230.0	116.6	72.8	29.4	—	11.2
1958	372.3	133.4	202.7	30.2	—	6.0
1959	636.6	86.3	500.3	47.8	—	2.2
1960	1,276.8	473.1	744.6	59.1	—	—
1961	2,085.7	985.5	1,008.8	91.4	—	—
1962	3,343.0	1,717.2	1,441.1	182.1	1.4	1.3
1963	5,618.7	3,467.1	1,883.9	249.3	16.8	1.5
1964	8,051.3	5,609.4	2,122.9	298.8	16.7	3.5
1965	9,181.5	7,713.3	2,122.4	309.6	32.1	4.0
1966	10,026.6	7,609.6	2,127.0	244.6	36.5	8.8
1967	9,108.1	6,716.2	2,105.6	231.1	48.6	6.7
1968	8,099.5	5,582.9	2,296.4	178.0	35.2	6.9
1969	7,339.7	4,731.4	2,430.7	136.3	36.0	5.3
1970	5,987.3	3,914.4	1,928.1	112.6	26.4	5.8
1971	5,227.4	3,315.9	1,770.3	101.7	31.2	8.3
1972	4,771.8	3,194.9	1,470.0	59.6	37.4	9.9
1973	4,518.3	2,938.6	1,490.7	48.9	28.1	12.0
1974	4,330.0	2,640.9	1,585.2	34.6	57.1	12.2
1975	3,965.6	2,392.7	1,484.7	27.8	51.6	8.8
1976	4,029.0	2,529.6	1,413.6	19.5	53.9	12.4
Tr. Qtr.	994.0	634.4	334.6	5.5	16.9	2.6
1977	3,949.6	2,557.4	1,302.1	15.8	61.7	12.6
1978	4,117.2	2,383.5	1,634.7	19.0	67.0	13.0
1979	4,164.4	2,290.0	1,768.8	33.5	59.6	12.5
1980	4,310.1	2,439.6	1,777.6	27.4	49.9	15.6
1981	4,692.0	2,496.7	2,114.5	24.0	41.5	15.4
1982[E]	5,064.8	2,526.5	2,445.4	20.6	58.4	14.0
1983[E]	5,808.5	2,761.3	2,950.6	14.2	67.0	15.5

Source: AIA, derived from NASA, "Aeronautics and Space Report of the President" (Annually).
NOTE: Detail may not add to totals because of rounding.

[a] FY 1984 and revised FY 1983 estimates not available at time of publication.
[b] Based on fiscal year GNP implicit price deflator.
[c] Excludes amounts for air transportation.
[d] Departments of Interior and Agriculture, and The National Science Foundation.
[E] Estimate.

FEDERAL SPACE ACTIVITIES BUDGET AUTHORITY

Fiscal Years 1955-1983[a]
(Millions of Current Dollars)

Year	TOTAL	NASA[b]	DOD	Energy	Commerce	Other[c]
1955	$ 60	$ 57	$ 3	$ —	$ —	$ —
1956	117	73	30	7	—	7
1957	179	78	71	21	—	8
1958	348	117	206	21	—	3
1959	785	261	490	34	—	—
1960	1,066	462	561	43	—	(*d*)
1961	1,808	926	814	68	—	1
1962	3,295	1,797	1,298	148	51	1
1963	5,435	3,626	1,550	214	43	2
1964	6,831	5,016	1,599	210	3	3
1965	6,956	5,138	1,574	229	12	3
1966	6,970	5,065	1,689	187	27	3
1967	6,710	4,830	1,664	184	29	3
1968	6,529	4,430	1,922	145	28	4
1969	5,976	3,822	2,013	118	20	3
1970	5,341	3,547	1,678	103	8	4
1971	4,741	3,101	1,512	95	27	5
1972	4,575	3,071	1,407	55	31	10
1973	4,825	3,093	1,623	54	40	15
1974	4,640	2,759	1,766	42	60	14
1975	4,914	2,915	1,892	30	64	13
1976	5,320	3,225	1,983	23	72	16
Tr. Qtr.	1,341	849	460	5	22	4
1977	5,983	3,440	2,412	22	91	18
1978	6,509	3,623	2,729	34	103	20
1979	7,419	4,030	3,211	59	98	21
1980	8,689	4,680	3,848	40	93	28
1981	9,978	4,992	4.828	41	87	30
1982[E]	12,041	5.462	6,387	38	125	29
1983[E]	14,839	6,122	8,502	31	151	34

Source: NASA, "Aeronautics and Space Report of the President" (Annually).
Note: Detail may not add to totals because of rounding.
a FY 1984 and revised FY 1983 estimates not available at time of publication.
b Excludes amounts for air transporation.
c Departments of Interior and Agriculture, and the National Science Foundation.
d Less than $500,000.
E Estimate.

FEDERAL SPACE ACTIVITIES BUDGET AUTHORITY IN CONSTANT DOLLARS

Fiscal Years 1955-1983[a]
(Millions of Constant Dollars, 1972 = 100[b])

Year	TOTAL	NASA[c]	DOD	Energy	Commerce	Other[d]
1955	$ 98	$ 93	$ 5	$ —	$ —	$ —
1956	186	116	48	11	—	11
1957	274	120	109	32	—	12
1958	521	175	308	31	—	4
1959	1,152	383	719	50	—	—
1960	1,537	666	809	62	—	(e)
1961	2,577	1,320	1,160	97	—	1
1962	4,616	2,518	1,818	207	71	1
1963	7,341	4,897	2,093	289	58	3
1964	9,226	6,775	2,160	284	4	4
1965	9,277	6,852	2,099	305	16	4
1966	9,055	6,580	2,194	243	35	4
1967	8,443	6,078	2,094	232	36	4
1968	7,930	5,381	2,335	176	34	5
1969	6,935	4,435	2,336	137	23	3
1970	5,866	3,896	1,843	113	9	4
1971	4,958	3,243	1,581	99	28	5
1972	4,575	3,071	1,407	55	31	10
1973[r]	4,619	2,961	1,554	52	38	14
1974[r]	4,139	2,461	1,575	37	54	12
1975[r]	3,984	2,364	1,534	24	52	11
1976[r]	4,034	2,445	1,504	17	55	12
Tr. Qtr.[r]	979	620	336	4	16	3
1977[r]	4,251	2,444	1,714	16	65	13
1978[r]	4,331	2,411	1,816	23	69	13
1979[r]	4,538	2,465	1,964	36	60	13
1980[r]	4,884	2,631	2,163	22	52	16
1981	5,108	2,556	2,472	21	45	15
1982[E]	5,759	2,612	3,055	18	60	14
1983[E]	6,760	2,789	3,873	14	69	15

Source: AIA, derived from NASA, "Aeronautics and Space Report of the President," (Annually).

[a] FY 1984 and revised FY 1983 estimates not available at time of publication.

[b] Based on fiscal year GNP implicit price deflator.

[c] Excludes amounts for air transportation.

[d] Departments of Interior and Agriculture, and The National Science Foundation.

[e] Less than $500,000.

[E] Estimate.

[r] Revised.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY AND OUTLAYS

Fiscal Years 1960-1984
(Millions of Current Dollars)

	BUDGET AUTHORITY				OUTLAYS			
Year	TOTAL	Research and Development	Construction of Facilities	Research and Program Management	TOTAL	Research and Development	Construction of Facilities	Research and Program Management
1960	$ 614	$ 333	$190	$ 91	$ 401	$ 256	$ 54	$ 91
1961	964	672	125	167	744	487	98	159
1962	1,825	1,285	326	214	1,257	936	114	207
1963	3,673	2,929	744	*(a)*	2,552	1,912	225	416
1964	5,099	3,890	713	496	4,171	3,317	438	416
1965	5,250	4,360	267	623	5,093	3,984	531	578
1966	5,175	4,502	61	612	5,933	4,741	573	619
1967	4,968	4,235	85	648	5,426	4,487	289	650
1968	4,589	3,912	38	639	4,724	3,946	126	652
1969	3,995	3,314	33	648	4,251	3,530	65	656
1970	3,749	2,993	53	703	3,753	2,992	54	707
1971	3,312	2,556	26	730	3,382	2,630	44	708
1972	3,308	2,523	53	732	3,422	2,623	50	749
1973	3,408	2,599	79	730	3,315	2,541	45	729
1974	3,040	2,194	101	745	3,256	2,421	75	760
1975	3,231	2,323	143	765	3,266	2,420	85	761
1976	3,552	2,678	82	792	3,669	2,749	121	799
Tr. Qtr.	932	700	11	221	952	731	26	195
1977	3,819	2,856	118	845	3,945	2,980	105	860
1978	4,064	3,012	162	890	3,983	2,989	124	870
1979	4,559	3,477	148	934	4,196	3,139	133	925
1980	5,243	4,088	159	996	4,852	3,702	140	1,010
1981	5,522	4,334	117	1,071	5,426	4,228	147	1,050
1982	6,020	4,772	114	1,134	6,035	4,796	109	1,130
1983[E]	6,839	5,543	98	1,199	6,722	5,335	137	1,250
1984[E]	7,107	5,709	151	1,248	6,981	5,605	129	1,248

Source: "The Budget of the United States" (Annually); FY 82-84 Budget Authority from NASA FY 1984 Budget Briefing.
NOTE: Detail may not add to totals because of rounding
a Included in Research and Development for one year.
E Estimate.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION BUDGET AUTHORITY AND OUTLAYS IN CONSTANT DOLLARS

Fiscal Years 1960-1984
(Millions of Constant Dollars, 1972 = 100[a])

	BUDGET AUTHORITY				OUTLAYS			
Year	TOTAL	Research and Development	Construction of Facilities	Research and Program Management	TOTAL	Research and Development	Construction of Facilities	Research and Program Management
1960	$ 882	$ 479	$ 273	$131	$ 576	$ 368	$ 78	$131
1961	1,370	955	178	237	1,057	692	139	226
1962	2,556	1,800	457	300	1,761	1,311	160	290
1963	5,060	4,035	1,025	*(b)*	3,516	2,634	310	573
1964	6,923	5,282	968	673	5,663	4,504	595	565
1965	7,000	5,813	356	831	6,791	5,312	708	771
1966	6,723	5,848	79	795	7,707	6,159	744	804
1967	6,252	5,330	107	816	6,829	5,647	364	818
1968	5,575	4,753	46	776	5,739	4,794	153	792
1969	4,635	3,845	38	752	4,932	4,096	75	761
1970	4,116	3,286	58	772	4,121	3,285	59	776
1971	3,463	2,673	27	763	3,537	2,750	46	740
1972	3,308	2,523	53	732	3,422	2,623	50	749
1973	3,263	2,488	77	699	3,174	2,433	43	698
1974	2,712	1,957	90	665	2,905	2,160	67	678
1975	2,620	1,884	116	620	2,648	1,962	69	617
1976	2,693	2,030	62	601	2,782	2,084	92	606
Tr. Qtr.	681	511	8	161	695	534	19	142
1977	2,713	2,029	84	600	2,803	2,117	75	611
1978	2,704	2,004	108	592	2,650	1,989	83	579
1979	2,789	2,127	91	571	2,567	1,920	81	566
1980	2,947	2,298	89	560	2,727	2,081	79	568
1981	2,827	2,219	60	548	2,778	2,164	75	538
1982	2,879	2,282	55	542	2,886	2,294	53	540
1983[E]	3,115	2,525	45	546	3,062	2,430	62	569
1984[E]	3,074	2,469	65	540	3,019	2,424	56	540

Source: AIA, derived from "The Budget of the United States" (Annually) and NASA FY 1984 Budget Briefing.
NOTE: Detail may not add to totals because of rounding.
a Based on fiscal year GNP implicit price deflator.
b Included in Research and Development for one year.
E Estimate.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION RESEARCH AND DEVELOPMENT PROGRAMS BUDGET AUTHORITY

Fiscal Years 1980-1984
(Millions of Dollars)

	1980	1981	1982	1983[E]	1984[E]
TOTAL	$4,088	$4,334	$4,772	$5,543	$5,709
Space Transportation Systems—TOTAL	2,385	2,729	3,090	3,598	3,498
Space Transportation Capability Development	NA	NA	2,623	2,144	1,927
Space Transportation Operations			467	1,454	1,571
Space Science and Applications—TOTAL	933	873	896	1,034	1,068
Physics and Astronomy	337	324	322	441	515
Planetary Exploration	220	176	210	186	205
Life Sciences	44	42	40	56	59
Solid Earth Observations	332	332	149	132	74
Environmental Observations			133	157	163
Materials Processing in Space			16	22	22
Communications			21	32	21
Information Systems			4	8	9
Technology Utilization—TOTAL	12	9	8	9	4
Aeronautics and Space Technology—TOTAL	427	384	376	403	438
Aeronautical Research and Technology	308	271	265	280	300
Space Research and Technology	116	111	111	123	138
Energy Technology	3	2	—	—	—
Tracking and Data Acquisition—TOTAL	332	340	402	499	700

Source: "The Budget of the United States" and "NASA Budget Briefing Background Material" (Annually).
NOTE: Detail may not add to totals because of rounding.
E Estimate.
NA Not available.

DEPARTMENT OF DEFENSE SPACE AND SPACE-RELATED PROGRAMS[a]

Fiscal Years 1975-1984
(Millions of Dollars)

Program	1980	1981	1982	1983[E]	1984[E]
TOTAL	$3,848.4	$4,797.1[b]	$6,362.3	$8,510.0	$9,239.0
Mission-Oriented—TOTAL	977.3	1,218.2	1,910.9	2,670.0	2,560.0
Navigation	185.6	166.9	224.5	290.0	471.0
Communications	506.2	687.6	979.7	1,340.0	1,347.0
Warning	207.3	265.6	563.2	710.0	562.0
Mapping/Charting/Geodesy	10.3	11.6	29.2	100.0	63.0
Weather	67.9	86.5	114.3	230.0	117.0
Vehicle Development	661.0	758.5	863.8	1,070.0	1,252.0
Space Ground Support[c]	242.3	315.2	433.4	600.0	759.0
Supporting R&D[d]	427.7	586.1	755.2	900.0	1,076.0
General Support[e]	1,540.1	1,919.1	2,399.0	3,270.0	3,592.0
Program (Continued)	**1975**	**1976**	**1977**	**1978**	**1979**
TOTAL	$1,892.4	$1,983.3	$2,411.9	$2,728.8	$3,211.3
Mission-Oriented—TOTAL	582.4	609.7	989.3	904.0	860.3
Navigation	47.6	104.8	104.9	93.8	117.7
Communications	361.5	361.4	720.9	574.2	458.6
Warning	136.5	88.7	87.9	150.0	214.3
Mapping/Charting/Geodesy	7.7	8.5	7.7	7.3	8.5
Weather	29.1	46.3	67.9	78.7	61.2
Vehicle Development	36.8	54.7	108.3	289.6	509.6
Space Ground Support[c]	91.9	111.7	123.6	173.7	210.9
Supporting R&D[d]	137.1	159.3	209.5	296.0	434.0
General Support[e]	1,044.2	1,047.9	981.2	1,065.5	1,196.5

Source: Department of Defense, statement to Subcommittee on Science, Technology and Space of the Senate Committee on Commerce, Science and Transportation (Annually).

[a] Total obligational authority.

[b] Total subsequently revised to $4,828 million; program detail not available.

[c] Includes range support, instrumentation, ground based satellite detection, tracking, and control.

[d] Includes research, exploratory and advanced development.

[e] Includes support organizations as well as general operational support.

[E] Estimate.

DEPARTMENT OF DEFENSE SPACE PROGRAMS[a] PROCUREMENT (INCLUDING INITIAL SPARES) AND RDT&E

Fiscal Years 1982, 1983 and 1984
(Millions of Dollars)

Agency and Program	1982		1983[E]		1984[E]	
	Procurement	RDT&E	Procurement	RDT&E	Procurement	RDT&E
AIR FORCE						
Afsatcom	$ —	$ 79.2	$ 28.4	$ 46.1	$ 30.7	$188.6
Defense Meteorological Satellite Program (DMSP)	36.6	43.5	166.8	25.4	33.9	26.7
Defense Satellite Communications System (DSCS)	129.7	60.9	181.6	51.6	117.0	41.0
Navstar Global Positioning System	20.1	165.4	101.5	122.7	238.6	95.7
Space Defense System	—	202.0	—	216.0	19.4	205.6
Space Launch Support	68.6	20.2	152.7	16.4	140.2	34.7
Space Shuttle	193.9	276.7	135.0	355.1	195.3	337.4
Space Boosters	67.1	19.4	70.7	15.0	—	15.7
NAVY						
Fleet Satellite Communications (Fltsatcom)	$ 64.9	$ 3.5	$230.3	$ 3.9	$115.1	$ 7.6

Source: "Program Acquisition Costs by Weapon System," "Procurement Program (P-1)," and "R,D,T&E Programs (R-1)," Department of Defense Budget (Annually).

[a] Total Obligational Authority.

[E] Estimate.

SALES AND BACKLOG
SPACE VEHICLE SYSTEMS[a]

(Excluding Engines and Propulsion Units)
Calendar Years 1968-1982
(Millions of Dollars)

Year	Net Sales			Backlog, December 31		
	TOTAL	Military	Non-Military	TOTAL	Miltary	Non-Military
CURRENT DOLLARS						
1968	$2,357	$ 899	$1,458	$1,329	$ 834	$ 495
1969	2,282	1,187	1,095	1,330	869	461
1970	1,956	1,025	931	1,184	786	398
1971	1,725	860	865	916	603	313
1972	1,656	905	751	959	646	313
1973	1,562	902	660	1,177	923	254
1974	1,751	944	807	1,492	1,131	361
1975	2,119	1,096	1,023	1,304	1,019	285
1976	2,002	904	1,098	1,234	902	332
1977	1,870	814	1,056	1,589	1,263	326
1978	2,324	1,006	1,318	2,188	1,693	495
1979	2,539	1,105	1,434	1,448	909	539
1980	3,483	1,461	2,022	2,099[r]	1,218[r]	881[r]
1981[r]	3,856	1,736	2,120	3,174	2,164	1,010
1982	4,851	2,581	2,270	2,918	2,086	832
CURRENT DOLLARS (1972 = 100)[b]						
1968	$2,856	$1,089	$1,766	$1,610	$1,010	$ 600
1969	2,629	1,368	1,262	1,532	1,001	531
1970	2,139	1,121	1,018	1,295	859	435
1971	1,797	896	901	954	628	326
1972	1,656	905	751	959	646	313
1973[r]	1,477	853	624	1,113	872	240
1974[r]	1,522	820	701	1,296	983	314
1975[r]	1,685	871	813	1,037	810	227
1976[r]	1,513	683	830	932	682	251
1977[r]	1,335	581	754	1,135	902	233
1978[r]	1,545	669	876	1,455	1,126	329
1979[r]	1,554	676	877	886	556	330
1980[r]	1,950	818	1,132	1,175	682	493
1981[r]	1,972	888	1,084	1,623	1,107	517
1982	2,341	1,245	1,095	1,408	1,007	401

Source: Bureau of the Census, "Current Industrial Reports," Series MQ37D (Quarterly).

[a] Space vehicle systems and parts sold to other than U.S. Government customers included as of 1980; previously, this product group combined with missile systems and parts.

[b] Based on GNP implicit price deflator; detail may not add to totals because of rounding.

[r] Revised.

AIR TRANSPORTATION

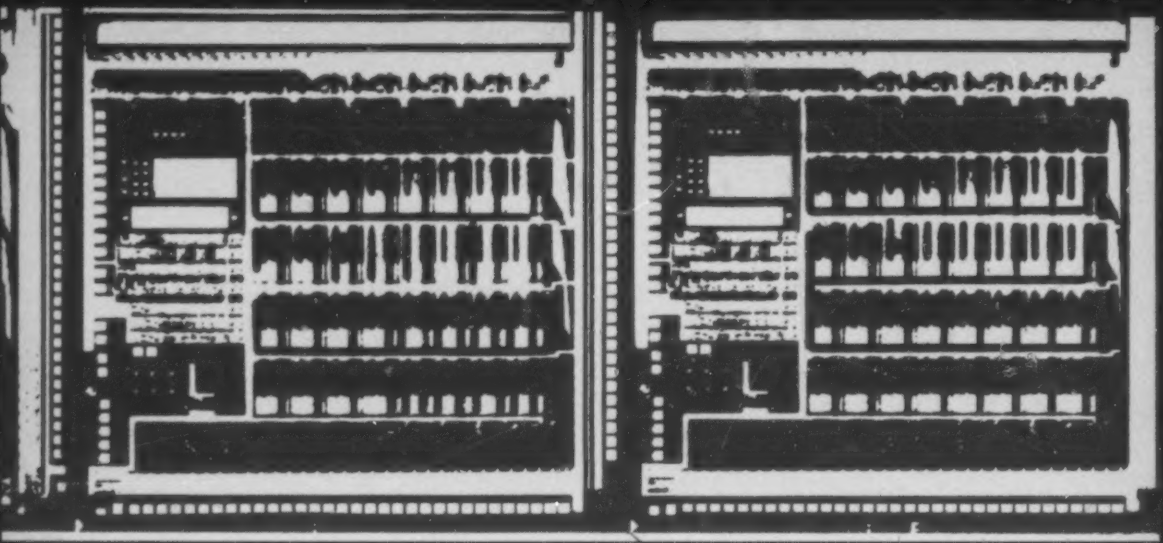
In 1982, the U.S. airline industry experienced the worst financial year in its history, recording an operating loss of $702 million. This was the third consecutive year of operating losses, following previous record levels of $401 million in 1981 and $222 million in 1980.

The 1982 operating loss occurred despite improved passenger traffic and load factor, and only a 0.3 percent increase in operating expenses, all of which were insufficient to offset the 0.5 percent drop in operating revenues, the first such annual decline in U.S. airline history. The principal reasons for the industry's disappointing performance in 1982 were the deep discount fares being offered by the airlines in an intensely competitive environment, and the increasing proportion of passengers taking advantage of those fares. Due to discount fares, the yield on domestic and international passenger service dropped about four percent in 1982, and the number of passengers paying full fare also dropped; it has fallen from 52 percent in 1978 to only 15 percent in 1982. Labor, the largest item of airline expenses, rose between 1981 and 1982, to 35 percent of operating costs, despite a decrease in the number of employees. Fuel, the second largest expense item, dropped from 30 to 28 percent of cash operating expenses, with the average cost per gallon falling 5.9 cents, from $1.04 to 98 cents, producing industry savings of $541 million.

After two years of decline, passenger traffic increased moderately in 1982. Including both domestic and international service, the U.S. scheduled airlines boarded 293 million passengers and flew them 259 billion miles; the figures compare with 286 million passengers flown 249 billion passenger miles in 1981. The revenue passenger load factor was 59 percent, compared with 58.6 percent in 1981. Cargo ton miles, at 6.9 billion, were down about 2.8 percent from 1981's 7.1 billion. The total revenue load factor was 52.7 percent, higher than in both 1980 and 1981.

Among other statistical highlights of the U.S. scheduled airlines' 1982 performance:

- Domestic flights accounted for 93 percent of all passengers boarded, same as a year earlier. The airlines carried 273 million passengers on domestic flights, compared with 265 million in 1981.
- International traffic declined for the third straight year. Passengers carried on international routes totaled just under 20 million, down from 20.7 million in 1981.



U.S. air carriers, including operators other than scheduled airlines, were flying 4,074 aircraft at the end of 1982; the figure represents an increase of 101 units over 1981. Turbojet aircraft numbered 2,674, about 66 percent of the total. The fleet also included 826 turboprops, 569 piston engine planes and five helicopters.

Worldwide commercial air traffic edged up moderately. World scheduled airlines, excluding those of the Soviet Union, boarded 651 million passengers, which compares with 640 million in 1981, and flew them 600 billion passenger miles, 12 billion more than in 1981. Cargo ton miles increased slightly, from 19.3 billion in 1981 to 19.6 billion in 1982.

When the Soviet Union is included, passenger boardings totaled 765 million, compared with 749 milion in 1981. Passenger miles amounted to 716 billion, up from 694 billion, and cargo ton miles totaled 21.4 billion, up from 21 billion.

Despite the airlines' financial difficulties and the continuing lull in deliveries of new aircraft, the world fleet of turbine engine aircraft in airline service increased between 1981 and 1982, according to the annual survey conducted by Exxon International. As of March 31, 1982, the world fleet—excluding airplanes operated by the Soviet Union—totaled 9,220 aircraft, an increase of 494 over 1981 and the highest number ever reported by the survey. Of the total, 6,275 aircraft—68 percent—were turbojets, 190 more than in 1981; 2,697 were turboprops (up 189) and there were 248 turbine-powered helicopters (up 115).

Of the total 9,220 planes in airline service, 6,199, or 67.2 percent were of U.S. manufacture; the percentage compares with 67.6 percent in 1981. Of the 6,275 turbojet-powered transports, 5,325—84.9 percent—were built in the U.S.; the latter figure compares with 85.3 percent in the previous year.

At the end of 1982, the U.S. air transportation system included 15,831 civil and joint use airfield facilities in the U.S., Puerto Rico, the Virgin Islands and the Pacific trust territories. A breakdown shows 12,596 airports, 4,158 of them publicly owned and 8,438 privately owned; 2,712 heliports (516 public and 2,196 private); 65 stolports (three public and 62 private); and 458 seaplane bases (128 public, 330 private). Texas led the list with 1,484 facilities of all types, followed by Illinois (908), California (843), Pennsylvania (696), Ohio (681) and Alaska (666).

WORLD AIRLINE TRAFFIC SCHEDULED SERVICES

Calendar Years 1970-1982
(Millions)

Year	Miles Flown	Passengers Carried	Passenger-Miles	Cargo Ton-Miles	Mail Ton-Miles
			Excludes U.S.S.R.		
1970	4,360	311	237,000	7,260	1,880
1971	4,390	333	252,000	7,880	1,750
1972	4,490	368	289,000	9,060	1,660
1973	4,670	404	323,000	10,670	1.700
1974	4,580	423	340,000	11,630	1,680
1975	4,670	436	357,000	11,820	1,660
1976	4,870	476	393,000	13,240	1,740
1977	5,030	517	430,000	14,620	1,830
1978	5,280	581	495,000	16,170	1,880
1979	5,690	652	565,000	17,580	1,970
1980	5,780[r]	644[r]	577,000	18,230	2,130[r]
1981[r]	5,620	640	588,000	19,270	2,200
1982[E]	5,300	651	600,000	19,620	2,230
			Includes U.S.S.R.		
1970	NA	382	286,000	8,280	2,150
1971	NA	411	307,000	9,060	1,990
1972	NA	450	348,000	10,290	1,900
1973	NA	489	384,000	12,010	1,970
1974	NA	515	407,000	13,030	1,970
1975	NA	534	433,000	13,270	1,990
1976	NA	576	475,000	14,750	2,080
1977	NA	610	508,000	16,180	2,160
1978	NA	679	582,000	17,770	2,240
1979	NA	754	659,000	19,180	2,350
1980	NA	748	677,000[r]	19,950	2,520
1981[r]	NA	749	694,000	20,970	2,600
1982[E]	NA	765	716,000	21,400	2,650

Source: International Civil Aviation Organization, "Development of World Scheduled Revenue Traffic" (Annually).
NOTE: Excludes states which were not members of ICAO on December 31, 1982. Figures represent revenue traffic on international and domestic scheduled services.
r Revised.
E Estimate.
NA Not Available.

WORLD AIRLINE FLEET
TURBINE-ENGINED AIRCRAFT

By Model
Years 1978-1982

	1978	1979	1980	1981	1982
TOTAL AIRCRAFT IN SERVICE	7,550	7,787	8,010	8,726	9,220
Number Manufactured in U.S.	5,159	5,341	5,590	5,900	6,199
Percent Manufactured in U.S.	68.3%	68.6%	69.8%	67.6%	67.2%
Turbojets—TOTAL	5,288	5,534	5,756	6,085	6,275
Aerospatiale SE-210 Caravelle	131	111	102	119	93
Aerospatiale SN-601 Corvette	22	19	13	11	11
Airbus A300	53	76	102	132	168
B.Ae. 111	164	162	158	159	156
B.Ae. HS-125	5	5	6	6	9
B.Ae. VC-10	17	17	6	1	—
B.Ae./Aerospatiale Concorde	9	9	13	14	14
B.Ae. Comet	10	7	4	—	—
B.Ae. Trident	99	97	64	86	71
Boeing 707/720	673	638	569	547	512
Boeing 727	1,315	1,427	1,560	1,585	1,636
Boeing 737	498	555	593	708	779
Boeing 747	308	349	420	478	517
Cessna 500/550 Citation I/II	4	3	13	37	25
Convair 880/990	13	13	14	12	13
Dassault Falcon 10/20	47	36	33	45	40
Dassault Mercure	10	10	10	10	10
Fokker F.28 Fellowship	103	122	115	128	133
Gates Learjet	11	10	14	35	21
Gulfstream G-1159 II/III	5	6	8	12	16
Ilyushin IL-62	32	39	41	39	47
Ilyushin IL-76	—	—	6	2	11
Israel Aircraft 1121/1124	—	—	—	5	10
Lockheed L-1329 JetStar	1	1	1	4	7
Lockheed L-1011 TriStar	145	160	177	192	215
MBB Hansa HFB-320	—	—	6	5	—
McDonnell Douglas DC8	450	396	382	358	301
McDonnell Douglas DC-9	794	836	856	882	941
McDonnell Douglas DC-10	248	276	307	338	342
Rockwell Sabreliner	2	1	2	—	—
Tupolev Tu. 124	—	—	2	—	2
Tupolev Tu. 134	66	68	82	68	89
Tupolev Tu. 154	17	26	33	31	38
VFW-Fokker 614	11	12	2	5	—
Yakolev Yak-40/42	25	47	42	31	48
Turboprops—TOTAL	1,931	2,013	2,059	2,508	2,697
Aerospatiale N.262 Mohawk 298	40	33	30	29	22

(Continued on next page)

WORLD AIRLINE FLEET
TURBINE-ENGINED AIRCRAFT (Continued)

By Model
1978-1982

	1978	1979	1980	1981	1982
Turboprops (continued)					
Antonov An.12	2	2	10	3	8
Antonov An.24/26	65	90	125	96	149
Antonov An.30	—	—	1	—	—
B.Ae. HP-137 Jetstream	8	6	3	17	17
B.Ae. Vanguard	24	23	11	8	9
B.Ae. Viscount	86	91	84	77	78
B.Ae. HS-748	138	133	141	144	151
Beech 99	110	118	107	123	128
Beech 90 King Air	19	11	15	16	20
Beech 100 King Air	—	—	—	—	8
Beech 200 King Air	—	—	—	20	22
Beech 18-TP Conv.	6	6	5	—	—
Bristol 175 Britannia	14	9	10	12	10
Canadair CL-44	24	17	12	10	8
CASA/Nurtanio C-212	6	9	9	34	60
Cessna 400 Srs. TP Conv.	1	1	2	—	—
Cessna 425 Corsair	—	—	—	—	2
Cessna 441 Conquest	—	—	—	2	4
Convair 580/600/640	104	121	132	147	156
DHC-2 Turbo Beaver	7	14	11	8	8
DHC-6 Twin Otter	335	327	321	456	449
DHC-7 Dash 7	4	8	18	38	59
Dornier DO 128 Turbo-Skyservant	—	—	—	—	1
Embraer EMB-110 Bandeirante	49	61	60	157	189
Fokker/Fairchild F-27/FH-227 Friendship	370	364	363	402	377
GAF Nomad	6	10	9	34	42
Grumman G-159 Gulfstream	—	—	8	16	15
Grumman G-73 Turbo Mallard	—	—	—	1	1
Grumman G-21C Turbo Goose	2	2	3	2	2
Handley Page Herald	32	36	34	31	34
Hawker-Siddeley Argosy	8	9	8	5	5
Ilyushin IL-18	72	82	79	61	72
Israel Aircraft Arava 101B	—	—	—	—	3
LET L-410	12	11	11	11	—
Lockheed L-188 Electra	87	86	89	96	88
Lockheed L-100/L-382 Hercules	36	44	41	48	49
Mitsubishi MU-2B	15	15	10	13	13
NAMC YS-11	126	121	112	117	114
Pilatus PC-6 Turbo Porter	12	12	7	5	8
Piper Cheyenne I/II	2	1	1	6	8
Rockwell Turbo Commander	1	2	1	12	9

(Continued on next page)

WORLD AIRLINE FLEET
TURBINE-ENGINED AIRCRAFT (Continued)
By Model
1978-1982

	1978	1979	1980	1981	1982
Turboprops (continued)					
Saunders ST-27	2	2	11	5	9
Shorts SC-5 Belfast	—	—	—	—	3
Shorts SC-7 Skyliner/Skyvan	29	21	22	29	36
Shorts 330	—	26	36	63	72
Swearingen Merlin	—	—	3	6	4
Swearingen Metro	47	81	108	143	169
Transall C-160	—	—	—	5	6
Other	24	8	—	—	—
Turbine-Powered Helicopters—TOTAL	331	240	195	133	248
Aerospatiale SA-315 Lama	8	—	—	2	3
Aerospatiale SA-318 Alouette	26	21	7	7	2
Aerospatiale SA-321 Super Frelon	—	—	1	—	—
Aerospatiale SA-330 Puma	20	20	17	3	2
Aerospatiale AS-332 Super Puma	—	—	—	1	1
Aerospatiale SA-341 Gazelle	—	—	—	1	2
Aerospatiale AS-350 Ecureuil/ AStar	—	—	—	—	1
Aerospatiale AS-355 Ecureuil 2/ Twinstar	—	—	—	—	2
Aerospatiale SA-360 Dauphin	—	—	—	7	7
Bell/Bell (Fuji) 204	9	9	5	4	13
Bell 205	27	4	1	—	6
Bell/Bell (Agusta) 206	79	50	26	7	81
Bell 212	15	11	7	5	15
Bell 222	—	1	—	—	—
Bell 214	1	1	4	3	4
Boeing Vertol 234 Chinook	—	—	—	1	6
Hughes (Kawasaki) 500	76	63	72	24	24
M.B.B./Nurtanio Bo. 105	6	5	4	11	9
Mil Mi-8	—	—	3	—	—
Sikorsky S-55T	2	3	—	3	3
Sikorsky S-58T	12	10	8	9	13
Sikorsky S-61	45	38	35	34	42
Sikorsky S-62	2	—	—	1	—
Sikorsky S-64	3	—	—	1	—
Sikorsky S-76	—	4	5	9	11
Westland 30	—	—	—	—	1

Source: Exxon International Company, "Air World Survey," (Annually).

NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and covers aircraft in service as of March 31 for 1982 data, and as of June 30 for prior years. Excludes air taxi operators. Effective 1979, excludes a number of companies operating smaller types of aircraft and not providing scheduled services.

U.S. TURBINE-ENGINED AIRCRAFT IN THE WORLD AIRLINE FLEET

Calendar Years 1978-1982

	1978	1979	1980	1981	1982
TOTAL AIRCRAFT IN SERVICE	7,550	7,787	8,010	8,726	9,220
Number Manufactured in U.S.	5,159	5,341	5,590	5,903[r]	6,199
Percent Manufactured in U.S.	68.3%	68.6%	69.8%	67.6%	67.2%
Turbojet Aircraft in Service	5,288	5,534	5,756	6,085	6,275
Number Manufactured in U.S. ..	4,467	4,671	4,916	5,188	5,325
Percent Manufactured in U.S. ..	84.5%	84.4%	85.4%	85.3%	84.9%
Turboprop Aircraft in Service ...	1,931	2,013	2,059	2,508	2,697
Number Manufactured in U.S. ..	422	477	515	638	685
Percent Manufactured in U.S. ..	21.9%	23.7%	25.0%	25.4%	25.4%
Turbine-Powered Helicopters In Service	331	240	195	133	248
Number Manufactured in U.S. ..	270	193	159	77[r]	189
Percent Manufactured in U.S. ..	81.6%	80.4%	81.5%	57.9[r]%	76.2%

Source: Exxon International Company, "Air World Survey," (Annually).

NOTE: The "Air World Survey" covers the world's airlines with the exception of Aeroflot, the USSR national airline, and includes aircraft in service as of March 31 for 1982 data, and as of June 30 for prior years. Excludes air taxi operators. Effective 1979, excludes a number of companies operating smaller types of aircraft and not providing scheduled service.

JET FUEL COSTS AND CONSUMPTION BY U.S. AIR CARRIERS[a]

Calendar Years 1970-1982

Year	Gallons Consumed (Millions)	Total Cost (Millions)	Cost Per Gallon (Cents)	Cost Index (1972 = 100)	Cost of Fuel as Percent of Cash Operating Expenses
1970	9,626.7	$1,051.1	10.9¢	93.7	12.7%
1971	9,758.3	1,103.4	11.3	97.0	12.6
1972	9,809.4	1,143.0	11.7	100.0	12.0
1973	10,333.0	1,315.5	12.7	109.3	12.2
1974	9,215.5	2,233.7	24.2	208.0	17.4
1975	9,132.6	2,657.4	29.1	249.7	19.1
1976	9,465.3	2,995.3	31.6	271.6	19.5
1977	9,911.1	3,587.2	36.2	310.6	20.5
1978	10,188.9	3,998.4	39.2	336.8	20.1
1979	10,690.5	6,178.2	57.8	496.0	25.1
1980	10,258.4	9,157.5	89.3	766.1	30.5
1981	9,389.2	9,765.6	104.0	892.7	30.3
1982	9,163.1	8,985.8	98.1	841.6	28.1

Source: Air Transport Association of America.

[a] Includes all Majors and some Nationals, per CAB classifications effective 1981, corresponding to previous categories of System Trunks and Local Service Carriers.

OPERATING REVENUES AND EXPENSES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1960-1982
(Millions of Dollars)

Year	TOTAL OPERATIONS[b]			Domestic Operations[r]			International Operations		
	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)	Operating Revenues	Operating Expenses	Operating Profit (or Loss)
1960	$ 2,884	$ 2,807	$ 78	$ 2,178	$ 2,141	$ 37	$ 706	$ 666	$ 40
1961	3,064	3,043	20	2,305	2,307	(2)	759	737	22
1962	3,439	3,249	190	2,589	2,488	100	850	760	90
1963	3,759	3,479	280	2,790	2,646	144	969	833	136
1964	4,251	3,781	470	3,169	2,849	320	1,082	932	150
1965	4,958	4,286	672	3,691	3,239	452	1,267	1,047	220
1966	5,745	4,970	775	4,171	3,670	502	1,574	1,300	274
1967	6,865	6,157	708	4,981	4,560	421	1,884	1,597	287
1968	7,753	7,248	505	5,691	5,397	295	2,062	1,852	210
1969	8,791	8,403	387	6,936	6,613	322	1,855	1,790	65
1970	9,290	9,247	43	7,180	7,181	(1)	2,109	2,066	44
1971	10,046	9,717	328	7,753	7,496	257	2,292	2,221	71
1972	11,163	10,578	584	8,652	8,158	493	2,512	2,420	91
1973	12,419	11,834	585	9,694	9,200	494	2,725	2,633	91
1974	14,703	13,978	725	11,546	10,761	785	3,157	3,218	(60)
1975	15,356	15,229	128	12,020	11,902	117	3,336	3,326	11
1976	17,503	16,781	721	13,899	13,324	575	3,605	3,457	147
1977	19,926	19,018	908	15,822	15,166	657	4,104	3,852	252
1978	22,892	21,527	1,366	18,189	17,172	1,018	4,703	4,355	348
1979	27,227	27,028	199	21,652	21,523	129	5,575	5,505	[illegible]
1980	33,728	33,949	(222)	26,404	26,409	(6)	6,543	6,766	(223)
1981	36,211	36,612	(401)	28,788	29,051	(264)	6,390	6,574	(184)
1982	36,013	36,715	(702)	28,730	29,466	(736)	6,435	6,454	(19)

Source: Civil Aeronautics Board, Information Management Division.
NOTE: Detail may not add to totals because of rounding.

[a] Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.

[b] For 1980 and subsequent years, includes 'Other' operations not reported as 'Domestic' or 'International.'

[r] Revised from data previously reported by AIA.

SOURCES OF OPERATING REVENUES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1968-1982
(Millions of Dollars)

Year	TOTAL Operating Revenues	Passenger Service[b]	Mail[c]	Freight[b] & Air Express	Excess Baggage	Other[c]
DOMESTIC OPERATIONS[r]						
1968	$ 5,691	$ 5,025	$183	$ 411	$ 9	$ 63
1969	6,936	6,097	223	523	12	81
1970	7,180	6,359	206	516	12	87
1971	7,753	6,849	227	549	14	114
1972	8,652	7,686	230	618	13	105
1973	9,694	8,518	263	703	14	196
1974	11,546	9,903	264	772	17	589
1975	12,020	10,301	253	792	19	655
1976	13,899	12,104	294	942	22	537
1977	15,822	13,773	355	1,109	21	564
1978	18,189	15,753	336	1,347	23	730
1979	21,652	18,931	417	1,485	28	791
1980	26,404	23,317	446	1,582	32	1,027
1981	28,788	25,504	497	1,659	36	1,091
1982	28,730	25,442	524	1,504	42	1,218
INTERNATIONAL OPERATIONS						
1968	$ 2,062	$ 1,542	$140	$ 346	$16	$ 17
1969	1,855	1,386	113	326	14	17
1970	2,109	1,630	145	286	15	34
1971	2,292	1,731	124	385	16	37
1972	2,512	1,906	110	449	14	32
1973	2,725	2,112	109	438	15	51
1974	3,157	2,353	118	542	21	122
1975	3,336	2,469	122	591	25	129
1976	3,605	2,665	112	626	27	175
1977	4,104	3,047	112	710	21	215
1978	4,703	3,534	117	750	20	282
1979	5,575	4,271	131	837	23	313
1980	6,543	4,984	175	1,011	25	348
1981	6,390	4,917	165	984	25	299
1982	6,435	4,959	177	989	25	284

Source: Civil Aeronautics Board, Information Management Division.

NOTE: Detail may not add to totals because of rounding.

[a] Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.

[b] Scheduled and charter.

[c] Subsidy included with Mail through 1979, and then included in Other, which also includes revenues not related to transport, plus, beginning in 1981, transport revenues not specifically broken out by category by some small carriers.

[r] Revised from data previously reported by AIA.

OPERATING EXPENSES OF U.S. AIR CARRIERS[a] DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1968-1982
(Millions of Dollars)

Year	TOTAL Operating Expenses	Flying Operations	Maintenance	Passenger Service	Aircraft & Traffic Servicing	Promotion and Sales	Depreciation & Amortization	Other[b]
DOMESTIC OPERATIONS								
1968	$ 5,397	$ 1,541	$ 931	$ 523	$ 965	$ 633	$ 552	$ 252
1969	6,613	1,948	1,058	645	1,184	771	697	311
1970	7,181	2,119	1,136	707	1,311	811	750	347
1971	7,496	2,255	1,130	742	1,394	839	754	382
1972	8,158	2,348	1,246	855	1,578	943	778	411
1973	9,200	2,638	1,408	968	1,835	1,057	839	456
1974	10,761	3,345	1,514	1,027	2,026	1,178	871	799
1975	11,902	3,919	1,611	1,117	2,158	1,271	891	936
1976	13,324	4,448	1,816	1,260	2,443	1,495	927	935
1977	15,166	5,288	2,001	1,461	2,728	1,713	967	1,008
1978	17,172	5,669	2,155	1,711	3,120	2,040	1,231	1,246
1979	21,523	7,998	2,457	2.091	3,702	2,564	1,373	1,337
1980	26,409	11,029	2,758	2,329	4,051	3,096	1,586	1,560
1981	29,051	12,037	2,822	2,522	4,497	3,708	1,723	1,742
1982	29.466	11,529	2,711	2,671	4,665	4,150	1,876	1,865
INTERNATIONAL OPERATIONS								
1968	$ 1,852	$ 540	$ 263	$ 193	$ 298	$ 268	$ 190	$ 100
1969	1,790	521	244	186	305	264	172	98
1970	2,066	586	266	233	365	301	202	113
1971	2,221	646	287	248	395	313	206	126
1972	2,420	674	325	271	434	351	225	140
1973	2,633	752	338	302	501	368	225	148
1974	3,218	1,136	381	295	538	386	230	252
1975	3,326	1,175	392	292	565	422	225	254
1976	3,457	1,215	399	300	597	473	205	268
1977	3,852	1,303	450	351	668	526	253	301
1978	4,355	1,351	498	427	768	623	323	363
1979	5,505	1,960	571	538	922	774	352	388
1980	6,766	2,775	616	600	1,049	917	385	423
1981	6,574	2,757	540	583	932	945	382	435
1982	6,454	2,596	508	574	891	963	395	527

Source: Civil Aeronautics Board, Information Management Division.
NOTE: Detail may not add to totals because of rounding.

[a] Scheduled and non-scheduled service for all certificated route air carriers. Excludes supplemental air carriers, commuters, and air taxis.

[b] General and administrative, and other transport-related expenses.

45

U.S. AIR CARRIERS
TOTAL ASSETS AND INVESTMENT IN EQUIPMENT

Calendar Years 1964-1982
(Millions of Dollars)

Year	TOTAL Assets	Value of Flight Equipment	Value of Ground Property & Equipment, & Other[a]	Less: Reserves for Depreciation & Overhaul	Equals: Net Value of Operating Property & Equipment	Investment in Operating Property and Equipment as a Percent of Total Assets
1964[r]	$ 4,602	$ 4,524	$ 614	$ 2,109	$ 3,029	65.8%
1965[r]	5,581	5,024	716	2,241	3,499	62.7
1966[r]	7,310	6,096	856	2,457	4,495	61.5
1967[r]	9,344	7,568	1,064	2,773	5,859	62.7
1968[r]	10,992	9,021	1,269	3,009	7,281	66.2
1969[r]	12,069	9,943	1,516	3,560	7,899	65.4
1970[r]	12,913	10,950	1,951	4,120	8,782	68.0
1971[r]	12,996	11,221	2,028	4,649	8,600	66.2
1972[r]	13,635	11,918	2,225	5,115	9,028	66.2
1973[r]	14,464	12,908	2,424	5,693	9,639	66.6
1974[r]	15,200	13,538	2,539	6,252	9,826	64.6
1975[r]	15,064	14,035	2,635	6,823	9,847	65.4
1976[r]	15,454	14,399	2,792	7,585	9,605	62.2
1977[r]	16,869	14,822	2,997	8,141	9,679	57.4
1978	20,745	16,127	3,367	8,799	10,696[r]	51.6
1979	24,907	18,561	3,985	9,746	12,800	51.4
1980	28,900	20,859	4,682	10,309	15,233[r]	52.7
1981[r]	30,513	22,375	5,175	11,028	16,521	54.1
1982	31,494	23,824	5,421	11,415	17,831	56.6

Source: Civil Aeronautics Board, Information Management Division.

[a] Includes land and construction in progress.

[r] Revised from data previously reported by AIA.

TRAFFIC STATISTICS
U.S. AIR CARRIER SCHEDULED SERVICE[a]

Calendar Years 1960-1982

Year	Revenue Ton Miles (Millions)			Total Available Ton Miles (Millions)	Total Revenue Load Factor	Aircraft Revenue Miles (Millions)	Average Over-All Flight Stage Length (Miles)	Average Available Seats per Aircraft Mile
	Passenger	Cargo[b]	Total					
1960	3,733	996	4,729	9,001	52.5%	998	259	69
1961	3,827	1,144	4,971	10,041	49.5	970	259	79
1962	4,210	1,360	5,570	11,468	48.6	1,010	276	86
1963	4,839	1,507	6,346	13,257	47.9	1,095	289	91
1964	5,630	1,803	7,434	15,514	47.9	1,189	301	93
1965	6,629	2,356	8,986	18,408	48.8	1,354	322	96
1966	7,736	2,949	10,686	20,939	51.0	1,482	339	98
1967	9,561	3,475	13,036	26,968	48.3	1,834	371	101
1968	11,023	4,226	15,249	33,221	45.9	2,146	401	107
1969	12,197	4,701	16,898	38,664	43.7	2,385	443	112
1970	13,171	4,994	18,166	41,693	43.6	2,426	473	117
1971	13,565	5,120	18,685	44,139	42.3	2,378	476	125
1972	15,241	5,506	20,746	45,583	45.5	2,376	471	129
1973	16,196	6,046	22,242	49,019	45.4	2,448	477	135
1974	16,292	6,133	22,425	46,848	47.9	2,258	478	140
1975	16,281	5,905	22,186	47,254	46.9	2,241	476	143
1976	17,899	6,222	24,121	49,325	48.9	2,320	480	146
1977	19,322	6,587	25,909	52,284	49.6	2,419	490	149
1978	22,678	7,001	29,679	54,765	54.2	2,520	502	152
1979	26,202	7,189	33,390	60,844	54.9	2,791	517	154
1980	25,519	7,084	32,603	62,983	51.8	2,816	526	158
1981	24,889	7,060	31,949	61,186	52.2	2,703	519	161
1982	25,904	6,859	32,763	62,212	52.7	2,688	545	167

Source: Civil Aeronautics Board, Information Management Division.
NOTE: Detail may not add to totals because of rounding.

[a] Includes international and domestic operations.

[b] Includes freight, air express, U.S. and foreign mail, and excess baggage.

PASSENGER STATISTICS
U.S. AIR CARRIER SCHEDULED SERVICE
DOMESTIC AND INTERNATIONAL OPERATIONS

Calendar Years 1968-1982

Year	Revenue Passenger Enplanements (Thousands)	Average Passenger Trip-Length (Miles)	Revenue Passenger Miles (Millions)	Available Seat Miles (Millions)	Revenue Passenger Load Factor[a]
DOMESTIC OPERATIONS					
1968	145,775	651	87,508	166,871	52.4%
1969	158,405	648	102,717	206,434	49.8
1970	153,662	679	104,147	213,160	48.9
1971	156,195	681	106,438	221,503	48.1
1972	172,452	685	118,138	226,614	52.1
1973	183,272	689	126,317	244,699	51.6
1974	189,733	684	129,732	233,880	55.5
1975	188,746	698	131,728	241,282	54.6
1976	206,279	704	145,271	261,248	55.6
1977	222,283	705	156,609	280,619	55.8
1978	253,957	719	182,669	299,542	61.0
1979	292,700	714	208,891	332,796	62.8
1980	272,829	736	200,829	346,028	58.0
1981	265,304	749	198,715	346,172	57.4
1982	273,494	766	209,578	358,431	58.5
INTERNATIONAL OPERATIONS					
1968	16,407	1,679	26,451	49,575	53.4%
1969	13,493	1,683	22,703	44,412	51.1
1970	16,260	1,695	27,563	51,960	53.0
1971	17,474	1,672	29,219	58,320	50.1
1972	18,897	1,813	34,268	60,797	56.4
1973	18,936	1,882	35,640	65,898	54.1
1974	17,725	1,872	33,186	63,126	52.6
1975	16,316	1,905	31,082	61,724	50.4
1976	17,039	1,979	33,717	61,574	54.8
1977	18,043	2,029	36,610	64,947	56.4
1978	20,759	2,125	44,112	69,209	63.7
1979	24,163	2,199	53,132	83,330	63.8
1980	24,074	2,258	54,363	86,507	62.8
1981	20,672	2,427	50,173	78,725	63.7
1982	19,750	2,504	49,460	80,526	61.4

Source: Civil Aeronautics Board, Information Management Division.

[a] Revenue passenger miles as a percent of available seat miles.

U.S. CIVIL AND JOINT-USE AIRCRAFT FACILITIES[a] BY TYPE AND STATE

As of December 31, 1982

State	TOTAL[a]	Public[b]	Paved	Lighted	State	TOTAL[a]	Public[b]	Paved	Lighted
Alabama	167	111	123	98	Nevada	128	72	54	27
Alaska	666	479	59	114	New Hampshire	54	29	30	19
Arizona	233	83	115	69	New Jersey	280	64	105	63
Arkansas	157	101	95	77	New Mexico	159	79	71	48
California	843	289	560	268	New York	486	205	183	137
Colorado	326	95	144	94	N. Carolina	280	127	117	106
Connecticut	105	28	60	28	N. Dakota	442	108	67	85
Delaware	35	13	13	14	Ohio	681	228	238	198
Dist. of Col.	16	2	13	5	Oklahoma	322	183	172	132
Florida	529	138	210	154	Oregon	332	111	131	85
Georgia	295	125	151	121	Pennsylvania	696	179	228	159
Hawaii	49	14	36	12	Rhode Island	18	8	10	7
Idaho	197	126	61	43	S. Carolina	135	75	63	64
Illinois	908	125	186	172	S. Dakota	163	80	49	75
Indiana	490	135	127	126	Tennessee	168	95	101	83
Iowa	273	159	118	157	Texas	1,484	458	685	411
Kansas	377	164	120	141	Utah	96	53	62	43
Kentucky	127	73	83	58	Vermont	63	22	16	11
Louisiana	303	99	148	78	Virginia	262	83	109	84
Maine	147	82	41	31	Washington	372	143	167	128
Maryland	147	48	63	50	W. Virginia	89	42	51	32
Massachusetts	134	54	81	44	Wisconsin	420	157	125	133
Michigan	421	244	158	169	Wyoming	105	48	45	34
Minnesota	498	163	106	142	**50 States-Total**	15,778	6,100	6,181	4,825
Mississippi	180	102	97	80	Puerto Rico	32	12	29	11
Missouri	398	160	161	141	Virgin Islands	6	2	2	2
Montana	191	128	82	82	S. Pacific[c]	15	13	11	6
Nebraska	331	111	91	93	**TOTAL**	15,831	6,127	6,223	4,844

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation" (Annually).

[a] 15,831 aircraft facilities consist of 12,596 airports (4,158 publicly owned and 8,438 privately owned), 2,712 heliports (516 publicly owned and 2,196 privately owned), 65 stolports (3 publicly owned and 62 privately owned), and 458 seaplane bases (128 publicly owned and 330 privately owned). Included in these data are facilities having joint civil-military use.

[b] 'Public' refers to use whether publicly or privately owned. 'Public' as used in the previous edition of AEROSPACE FACTS AND FIGURES referred to ownership.

[c] American Samoa, Guam, and Trust Territories.

COMPOSITION OF ACTIVE U.S. AIR CARRIER FLEET TYPE OF AIRCRAFT, NUMBER OF ENGINES AND MODEL

Active as of December 1978-1982

	1978	1979	1980	1981	1982
TOTAL	2,545	3,609	3,808[r]	3,973	4,074
Turbojets—TOTAL	2,237	2,486	2,531[r]	2,511	2,674
Four-Engine—TOTAL	509	517	441	365	354
Boeing 707/720	215	182	149	68	56
Boeing 747	115	131	144	147	144
B.Ae. Aerospatiale Concorde	—	9[a]	—	—	—
Convair 880(22)/990(30)	—	6	6	6	3
Lockheed L-1329	1	1	—	—	—
McDonnell Douglas DC-8	178	188	142	144	151
Three-Engine—TOTAL	1,146	1,256	1,347	1,363	1,387
Boeing 727	931	1,029	1,092	1,096	1,110
Lockheed L-1011	82	87	102	106	111
McDonnell Douglas DC-10	133	140	153	161	166
Twin-Engine—TOTAL	582	713	743[r]	783	933
Airbus A-300	6	12	19	25	30
Boeing 737	173	206	220	236	290
Boeing 757	—	—	—	—	2
Boeing 767	—	—	—	—	13
B.Ae. BAC-111	30	28	27	27	36
Canadair CL600	—	—	—	—	1
Cessna C500 Citation I	—	4	5[r]	1	2
Dassault MD-20, Falcon	—	44	42	27	23
Fokker F-28	—	—	5	9	11
Grumman G-1159	—	6	5	3	2
Hamburger Flugzeugbau HF-320	—	4	—	—	—
Hawker-Siddeley HS125	—	—	—	—	2
Israel Westwind 1123/1124	—	2	1	—	1
Learjet LR-23/LR-24	—	8	5	3	4
Learjet LR-25	—	6	7	1	—
Learjet LR-35	—	4	3	—	3
Learjet LR36	—	—	—	—	1
McDonnell Douglas DC-9	373	381	394	447	509
Rockwell NA-265	—	2	2	—	1
Sud Aviation SE210 Caravelle	—	6	5	2	2
Sud Aviation SN601	—	—	3	2	—
Turboprops—TOTAL	240	565	682	852	826
Four-Engine—TOTAL	67	81	92	105	116
Canadair CL44D	—	1	2	4	4
De Havilland DHC-7	—	8	18	29	43
Lockheed 188 Electra	46	52	52	51	47

(Continued on next page)

COMPOSITION OF ACTIVE U.S. AIR CARRIER FLEET
TYPE OF AIRCRAFT, NUMBER OF ENGINES AND MODEL (Continued)

	1978	1979	1980	1981	1982
Four-Engine (continued)					
Lockheed 382/L-100 Hercules	21	20	20	20	19
Vickers V745	—	—	—	1	3
Twin-Engine—TOTAL	173	484	590	747	710
Beech BE99	—	85	87	102	108
Beech BE90	—	3	2	2	4
Beech BE200	—	4	1	2	2
CASA C212 Aviocar	—	—	2	15	16
Cessna C441	—	—	1	—	2
Convair 580/600/640	91	120	119	251	98
DeHavilland DHC-6	13	78	107	96	101
Embraer EMB110	—	4	34	66	83
Fairchild/Fokker F-27/FH-227	30	28	15	16	23
Fairchild Swearingen SA-226	8	66	100	72	105
Fairchild Swearingen SA-227	—	—	—	4	26
GAF N22/N24 Nomad	—	1	9	3	2
Grumman G-73	—	—	—	1	4
Grumman G-159	1	15	16	17	19
Handley Page HP-137	—	16	15	12	12
Hawker-Siddeley HS748	1	1	2	2	5
Israel Aircraft AR101B	—	—	—	2	3
Nihon YS-11	19	18	22	27	27
Nord ND-262/STC-262	9	24	22	15	15
Piper PA31T	—	—	—	1	1
Short SD-3/SD-330	1	21	34	39	52
Short SC-7	—	—	2	2	2
Piston-Engine—TOTAL	65	557	593[r]	606	569
Four-Engine—TOTAL	42	58	73	68	57
DeHavilland DHC-114	—	7	27	21	16
Douglas DC-4	2	4	5	6	3
Douglas DC-6	39	46	41	41	38
Lockheed 1049	1	1	—	—	—
Twin-Engine—TOTAL	21	499	520[r]	535	510
Single-Engine—TOTAL	2	—	—	3	2
Helicopters—TOTAL	3	1	2	4	5

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Effective 1978, includes certified route air carriers, supplemental air carriers (charters), and all aircraft over 12,500 pounds operated by air taxis, commercial operators and travel clubs. Effective 1979, includes multi-engine aircraft in passenger service of commuters. "Active aircraft" must have a current U.S. registration and have been flown during the calendar year.

a Aircraft in use by foreign airlines and registered in the United States to carry passengers between two U.S. cities.

r Revised.

ACTIVE U.S. CIVIL AIRCRAFT[a]

As of December 31, 1960-1981

Year	TOTAL	Air Carrier[b]	General Aviation Aircraft					
			TOTAL	Fixed-Wing Aircraft			Rotor-craft[c]	Other[d]
				Multi-Engine	Single-Engine			
					4-place & over	3-place & less		
1960	78,684	2,135	76,549	7,243	34,829	33,472	634	371
1961	82,736	2,104	80,632	8,401	38,206	32,800	798	427
1962	86,168	2,047	84,121	9,186	41,120	32,341	967	507
1963	87,167	2,079	85,086	9,695	42,647	30,977	1,171	588
1964	90,823	2,081	88,742	10,644	45,777	30,367	1,306	648
1965	97,567	2,125	95,442	11,977	49,789	31,364	1,503	809
1966	106,978	2,272	104,706	13,548	52,972	35,687	1,622	877
1967	116,638	2,452	114,186	14,651	56,865	39,675	1,899	1,096
1968	126,823	2,586	124,237	16,760	60,977	42,830	2,350	1,320
1969	133,496	2,690	130,806	18,111	63,703	45,001	2,557	1,434
1970	134,422	2,679	131,743	18,291	64,759	44,884	2,255	1,554
1971	133,790	2,642	131,148	17,855	64,464	44,792	2,352	1,685
1972	147,593	2,583	145,010	19,849	70,998	49,448	2,787	1,928
1973	156,139	2,599	153,540	21,929	74,831	51,386	3,143	2,251
1974	163,974	2,472	161,502	23,418	78,924	53,008	3,610	2,542
1975	170,970	2,495	168,475	24,559	82,621	54,390	4,073	2,832
1976	180,796	2,492	178,304	25,684	88,211	56,730	4,505	3,174
1977	186,767	2,473	184,294	26,652	91,960	57,340	4,726	3,616
1978	201,323	2,545	198,778	28,782	101,466	59,185	5,315	4,028
1979	213,948[r]	3,609	210,339[r]	31,311	106,028	62,362	5,864	4,770
1980	214,853[r]	3,808[r]	211,045	31,664	107,930	60,505	6,001	4,945
1981	217,199	3,973	213,226	33,301	107,983	59,914	6,974	5,049

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Detail may not add to totals because of estimating procedures.

[a] Before 1971, an active aircraft was one certified as eligible to fly. Currently, an "active aircraft" must have a current U.S. registration and have been flown during the previous calendar year.

[b] Effective 1978, includes certificated route air carriers, supplemental air carriers (charters), and all aircraft over 12,500 pounds operated by air taxis, commercial operators and travel clubs. Effective 1979, includes multi-engine aircraft in passenger service of commuters.

[c] Includes autogiros; excludes air carrier helicopters.

[d] Includes gliders, dirigibles and balloons.

[r] Revised.

ACTIVE U.S. CIVIL AIRCRAFT BY PRIMARY USE AND TYPE OF AIRCRAFT

As of December 31, 1981

Primary Use[a]	TOTAL	Fixed Wing			Rotorcraft[b]	Other[c]
		Turbojet	Turboprop	Piston		
TOTAL—ALL AIRCRAFT	217,199	5,682	5,512	193,976	6,978	5,049
Air Carrier—TOTAL	3,973	2,511	852	606	4	—
Certificated Route Air Carriers	2,523	2,295	223	5	—	—
Supplemental Air Carriers	167	78	66	23	—	—
Commercial Operators	33	10	13	10	—	—
Air Taxis	117	22	32	61	2	—
Commuters	970	14	488	466	2	—
All Cargo	152	82	29	41	—	—
Air Travel Clubs	11	10	1	—	—	—
General Aviation—TOTAL	213,226	3,171	4,660	193,370	6,974	5,049
Executive	18,582	2,257	2,602	12,089	1,525	106
Business	47,716	522	962	45,214	950	65
Commuter[d]	1,023	18	232	755	17	—
Air Taxi[d]	7,226	136	427	5,897	732	32
Instructional	14,993	—	20	14,367	254	350
Rental	10,585	18	49	10,059	28	429
Personal	95,510	11	67	91,305	666	3,458
Aerial Application	7,976	—	67	6,758	1,150	—
Aerial Observation	3,384	10	5	2,621	657	89
Other Work	1,491	4	—	970	280	235
Other	4,741	190	225	3,331	711	281

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Detail may not add to totals because of estimating procedures.

[a] Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."

[b] Includes helicopters and autogiros.

[c] Includes gliders, dirigibles and balloons.

[d] Air taxis under 12,500 pounds and single-engine commuters; other aircraft in these categories included with "air carriers."

U.S. GENERAL AVIATION ACTIVE AIRCRAFT AND HOURS FLOWN BY PRIMARY USE

Calendar Years 1977-1981

Primary Use[a]	1977	1978	1979	1980	1981
ACTIVE AIRCRAFT AS OF DECEMBER 31					
TOTAL	184,294	198,778	210,339	211,045	213,226
Executive	8,782	12,666	13,638	14,860	18,582
Business	41,396	42,809	49,658	49,391	47,716
Commuter	6,838	7,936	8,399	944	1,023
Air Taxi				7,615	7,226
Instructional	16,096	14,742	15,456	14,862	14,993
Rental	8,619	8,189	12,771	11,829	10,585
Personal	88,292	96,209	94,427	96,222	95,510
Aerial Application[c]	13,533	16,226	15,989	15,323	7,976
Aerial Observation[c]					3,384
Other Work[c]					1,491
Other[c]					4,741
THOUSANDS OF HOURS FLOWN					
TOTAL	35,792	39,290	43,340	41,016	40,704
Executive	3,487	4,882	5,001	5,332	6,190
Business	6,822	8,014	8,979	8,434	8,122
Commuter[b]	4,130	4,424	4,573	961	979
Air Taxi[b]				3,535	2,809
Instructional	6,529	5,009	6,462	5,748	5,597
Rental	2,793	3,284	4,206	3,917	3,768
Personal	8,453	9,601	9,471	8,894	8,241
Aerial Application[c]	3,390	4,076	4,544	4,105	2,447
Aerial Observation[c]					1,402
Other Work[c]					369
Other[c]					769

Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

NOTE: Detail may not add to totals because of rounding and estimating procedures.

[a] Definitions of "primary use" categories available in Glossary of "FAA Statistical Handbook."

[b] Air taxis under 12,500 pounds and single-engine commuters; other aircraft in these categories classified as "air carriers."

[c] Prior to 1981, reported as Aerial Application (differently defined), Industrial, and Other.

ACTIVE U.S. AIRMAN CERTIFICATES HELD

As of December 31, 1978-1982

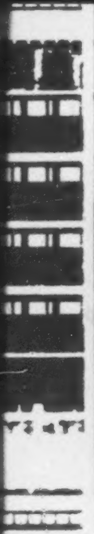
	1978	1979	1980	1981	1982
Pilots—TOTAL	798,833	814,667	827,071	764,182	733,255
Students	204,874	210,180	199,833	179,912	156,361
Private	337,644	343,276	357,479	328,562	322,094
Commercial	185,833	182,097	183,442	168,580	165,093
Airline Transport	55,881	63,652	69,569	70,311	73,471
Helicopter (only)	4,874	5,218	6,030	6,453	7,034
Glider (only)[a]	6,541	6,796	7,039	7,388	7,842
Other Pilot[a]	3,186	3,448	3,679	2,976	1,360
Non-Pilots—TOTAL	362,350	377,213	393,486	398,368	420,595
Mechanics[b]	228,743	237,611	250,157	262,705	277,436
Parachute Rigger[b]	9,200	9,381	9,547	9,716	9,893
Ground Instructor[b]	57,738	59,680	61,550	63,246	65,004
Dispatcher[b]	6,161	6,446	6,799	7,094	7,580
Control Tower Operator	25,388	25,232	25,130	15,528	20,934
Flight Navigator	2,092	1,994	1,936	1,785	1,695
Flight Engineer	33,028	36,869	38,367	38,294	38,053
Flight Instructor Certificates[c]	52,201	54,398	60,440	57,523	62,492
Instrument Ratings[c]	236,312	247,096	260,461	252,535	255,073

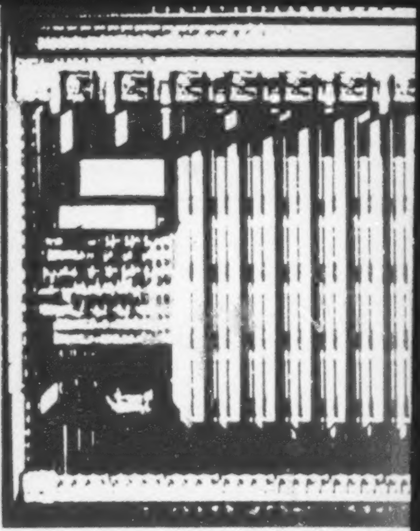
Source: Federal Aviation Administration, "FAA Statistical Handbook of Aviation," (Annually).

[a] Glider and lighter-than-air pilots are not required to have a medical examination; however, the totals above are the pilots who received a medical.

[b] No periodic medical examination required; therefore, no determination as to current activity can be made.

[c] Special ratings shown on pilot certificates represented above, not additional certificateS.





HELICOPTER TRANSPORTATION

Despite a decline in production of new helicopters, use of the helicopter as a civil transportation vehicle continued its steady growth in 1982, according to the *1982/83 Directory of Helicopter Operators* compiled by Aerospace Industries Association. The directory reported that the number of civil helicopters in the U.S., Canada, Mexico and Puerto Rico reached 8,884, an all-time high. The figure compares roughly with 8,575 rotary wing craft in 1980, the last prior year that the directory was published; that directory did not include Mexico, which had 32 helicopters in 1982.

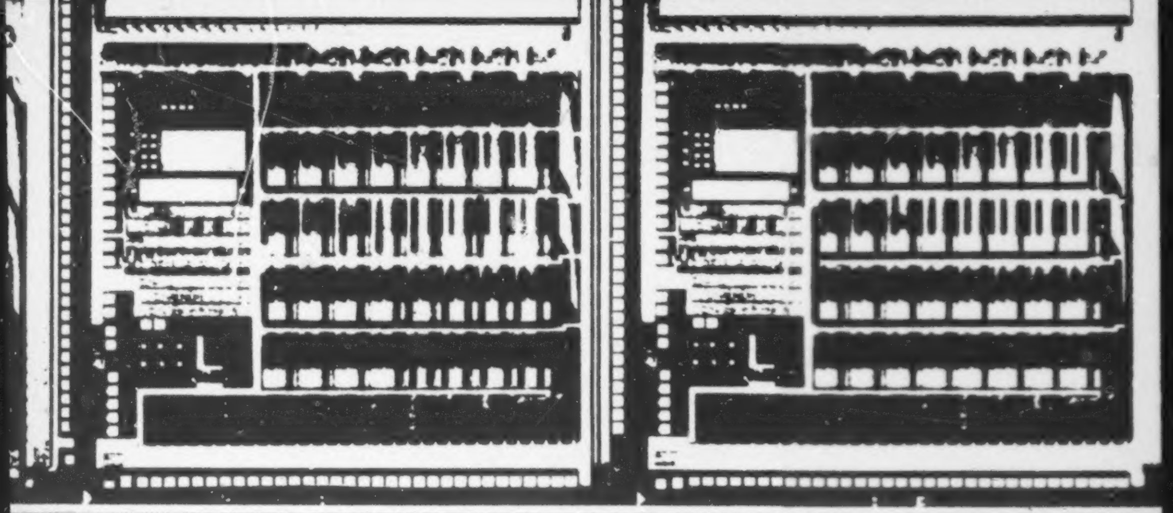
The number of civil helicopter operators reported during 1982 was 2,688, up from 2,573 in 1980. Commercial operators accounted for 1,188 of the total, or about 44 percent. The number of corporate/executive operators was 1,158, or 43 percent. This ratio represents a slight shift from 1980, when commercial operators accounted for 41 percent and corporate/executive operators 45 percent.

The directory shows that the 1982 fleet included 7,388 helicopters—more than 83 percent of the total—working in U.S. service; they included 4,627 commercial helicopters (63 percent), 1,575 corporate/executive craft, and 1,186 in government service. In Canada, there were 1,464 helicopters, 1,215 of them (83 percent) commercial; the Canadian inventory also included 153 corporate/executive aircraft and 96 helicopters in government service. Mexico had 32 helicopters, all working commercially, and Puerto Rico had 11, most of them government-operated.

In terms of operators in 1982, the U.S. had 2,441, or more than 90 percent of the total; they included 1,060 commercial, 1,058 corporate/executive and 323 civil government operators. Canada had 244 operators, Puerto Rico nine and Mexico three.

Among the states of the U.S., California led with 330 operators; Texas was second with 207, Florida next at 168 and Pennsylvania fourth with 107.

In terms of helicopters operated, California retained first place with 904, and Louisiana—due to the offshore oil connection—placed second with 840. Texas, at 638, was third, followed by Florida (538), Oregon (386), Alabama (333) and Alaska (329).



A resurgence of scheduled helicopter operations—in hiatus from 1978 to the latter part of 1980—was in evidence, with the number of operators increasing from four at the end of 1981 to nine by the spring of 1983. Three operators are located in California (one each in Los Angeles, San Francisco, and Oakland), two operate out of Houston, Texas, two others are in the New York City area, and Gary, Indiana, and Atlanta, Georgia, claim one each.

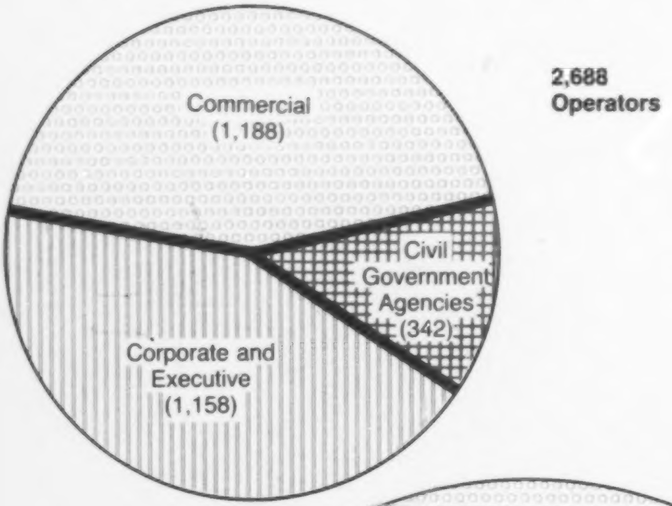
The nine commerical operators have a total fleet of 37 helicopters, consisting of fifteen Bell 206's, eight Aerospatiale Dauphins, seven Bell 222's, three Westland 30's, two Hughes 500's, and two Sikorsky S-58T's. The largest operator has a fleet of ten helicopters; two others have six and five, respectively; and the remainder all operate two or three.

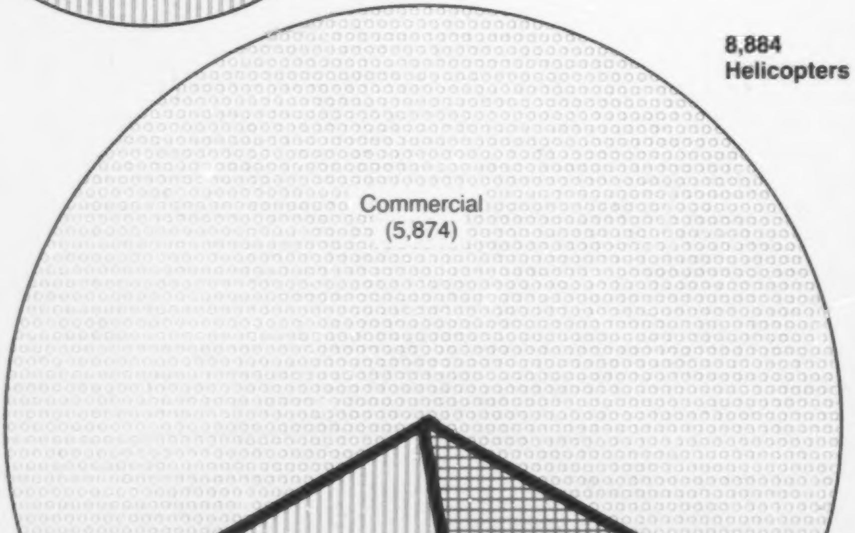
A helicopter operating milestone was achieved during a 29-day period in September, 1982, with the first round-the-world helicopter flight, during which H. Ross Perot Jr. and Jay Coburn flew a Bell LongRanger I for a distance of 24,749.87 statute miles, in a flight time of 241 hours, 43 minutes and 13 seconds. Among the highlights of the flight were two over-water legs of 804 and 734 miles, one to a refueling stop on the deck of an American Steamship Lines container ship anchored off the coast of Japan, and the second to the Aleutians.

Among development and production milestones during 1982 and early 1983, Bell Helicopter Textron received type certification of its Model 214ST Super-Transport from the U.S. Federal Aviation Administration and the British Civil Aviation Authority. British Caledonian Helicopters, Ltd., Aberdeen, Scotland was operating three 214STs. Bell also announced development of a new family of light helicopters in single and twin turbine versions. First in the series, a 5,500-pound TwinRanger, is expected to be test flown in 1984 and certificated in early 1985.

Sikorsky Aircraft introduced a new, improved S-76 Mark II twin-turbine transport helicopter and reported a record sales volume, more than $1 billion, for 1982, including commercial and military sales. Boeing Vertol delivered—in May 1983—a model 234 commercial helicopter to Norways' Helikopter Service AS; it was the first delivery to the second 234 customer.

CIVIL HELICOPTER OPERATIONS IN THE UNITED STATES, CANADA, MEXICO AND PUERTO RICO, 1982





Source: Aerospace Industries Association

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CIVIL HELICOPTER OPERATORS AND HELICOPTERS OPERATED IN THE UNITED STATES, CANADA, MEXICO AND PUERTO RICO[a]

Selected Years 1965-1982

Year	TOTAL	Commercial	Corporate and Executive	Civil Government Agencies[b]
CIVIL HELICOPTER OPERATORS				
1965	860	508	299	53
1966	933	519	353	61
1967	1,023	522	427	74
1969	1,379	689	596	94
1971	1,424	672	590	162
1972	1,491	758	566	167
1973	1,532	752	599	181
1974	1,536	725	608	203
1975	1,891	779	833	279
1976	2,330	911	1,082	337
1977	2,547	959	1,219	369
1978	3,003	1,126	1,515	362
1980[d]	2,573	1,065	1,160	348
1982	2,688	1,188	1,158	342
HELICOPTERS OPERATED[c]				
1965	2,053	1,537	401	115
1966	2,318	1,699	475	144
1967	2,438	1,764	487	187
1969	3,433	2,390	770	273
1971	3,874	2,605	802	467
1972	4,185	2,992	745	448
1973	4,601	3,295	780	526
1974	4,819	3,418	778	623
1975	5,222	3,342	1,056	824
1976	6,181	3,702	1,392	1,087
1977	7,160	4,294	1,578	1,288
1978	8,023	4,904	1,891	1,228
1980[d]	8,575	5,581	1,635	1,360
1982	8,884	5,874	1,728	1,282

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States, Canada, Mexico and Puerto Rico, 1982/83."

[a] Effective 1982, includes Mexico.

[b] Federal, state and local governments.

[c] Includes some helicopters on order.

[d] Because computerization of Directory data resulted in the elimination of some duplication of operator and helicopter listings, 1980 and subsequent data are not comparable with those of previous years.

CIVIL HELICOPTER FLEET
UNITED STATES, CANADA, MEXICO AND PUERTO RICO
1982

State	OPERATORS				HELICOPTERS			
	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.
Alabama	44	13	20	11	333	24	29	280
Alaska	41	27	8	6	329	311	10	8
Arizona	71	39	25	7	211	143	42	26
Arkanasas	16	8	5	3	32	19	8	5
California	330	159	122	49	904	495	199	210
Colorado	73	30	34	9	208	130	54	24
Connecticut	15	2	13	—	26	6	20	—
Delaware	7	2	4	1	8	2	4	2
Dist. of Col.	7	1	—	6	23	1	—	22
Florida	168	72	59	37	538	355	89	94
Georgia	32	14	9	9	71	31	9	31
Hawaii	21	17	3	1	48	40	6	2
Idaho	40	18	16	6	91	59	20	12
Illinois	52	24	18	10	148	77	48	23
Indiana	46	20	16	10	86	43	21	22
Iowa	24	11	8	5	37	15	9	13
Kansas	19	9	7	3	38	19	11	8
Kentucky	47	10	35	2	74	26	43	5
Louisiana	58	28	20	10	840	763	55	22
Maine	9	4	4	1	20	10	6	4
Maryland	16	7	6	3	55	33	6	16
Massachusetts	24	12	10	2	55	24	28	3
Michigan	56	22	23	11	97	43	29	25
Minnesota	33	17	15	1	55	34	17	4
Mississippi	14	5	3	6	28	11	3	14
Missouri	27	13	8	6	80	51	13	16
Montana	25	16	4	5	58	44	4	10
Nebraska	19	6	11	2	34	16	16	2
Nevada	27	12	10	5	62	35	18	9
New Hampshire	9	5	4	—	20	12	8	—
New Jersey	66	23	37	6	131	70	46	15
New Mexico	21	7	12	2	35	15	15	5

(Continued on next page)

CIVIL HELICOPTER FLEET
UNITED STATES, CANADA, MEXICO AND PUERTO RICO (Continued)
1982

State	OPERATORS				HELICOPTERS			
	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.	TOTAL	Commercial	Corp. and Exec.	Civil Gov't.
New York	96	31	54	11	264	148	83	33
North Carolina	21	6	12	3	47	21	14	12
North Dakota	17	14	3	—	32	29	3	—
Ohio	78	28	43	7	138	75	44	19
Oklahoma	39	18	19	2	141	94	32	15
Oregon	90	50	36	4	386	323	46	17
Pennsylvania	107	37	69	1	208	110	88	10
Rhode Island	6	4	1	1	14	11	2	1
South Carolina	22	5	12	5	49	30	13	6
South Dakota	8	3	2	3	12	4	5	3
Tennessee	51	17	25	9	111	50	27	34
Texas	207	88	104	15	638	381	207	50
Utah	24	17	6	1	151	141	9	1
Vermont	3	—	3	—	3	—	3	—
Virginia	35	12	16	7	58	24	18	16
Washington	85	46	32	7	182	127	38	17
West Virginia	48	10	34	4	63	16	39	8
Wisconsin	16	6	7	3	58	46	7	5
Wyoming	22	14	8	—	47	39	8	—
Puerto Rico	9	1	3	5	11	1	3	7
U.S. Total	2,441	1,060	1,058	323	7,388	4,627	1,575	1,186
Canada	244	125	100	19	1,464	1,215	153	96
Mexico	3	3	—	—	32	32	—	—
TOTAL	2,688	1,188	1,158	342	8,884	5,874	1,728	1,282

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States,Canada, Mexico and Puerto Rico, 1982/83".

SPECIFICATIONS OF U.S. CIVIL HELICOPTERS IN OPERATION/PRODUCTION

As of 1982

COMPANY	Commercial Model	Number of Places	Useful load (Lbs.)	Range with Useful Load (N. Miles)	External Cargo Payload (Lbs.)
Bell Helicopter Textron	47 Series	3-4	670-1210	212-258	0-1000
	AG-5	2	1300	102	—
	204B	10	4880	335	—
	205A-1	15	4323	276	5000
	206 Series*	4-5	1315-1630	240-304	1200-1500
	206L Series*	7	1894-1931	297-308	2000
	212*	15	5238	226	5000
	214 Series*	16-18	5450-8035	219-435	6000-8000
	222*	7-10	2985	356	2500
	412*	15	5333	232	5000
Boeing Vertol Company	107-II	28	10,171	200	11,500
	234 (LR)*	47	23,300	620	28,000
	234 (UT)*	3	30,000	264	28,000
Brantley-Hynes Helicopter, Inc.	B2B	2	670	225	400
	305	5	1200	275	800
The Enstrom Helicopter Corp.	F-28 Series*	3	700-850	238-272	500-1000
	280 Series*	3	700-850	243-272	500-1000
Hiller Aviation	12-E Series*	3-4	1264-1341	215	1000
	12-ET Series*	3-4	1450	351	1000
	FH-1100*	5	1355	396	1500
Hughes Helicopters, Inc.	300 Series*	3	698-1004	191-224	1104
	500 Series*	4-7	1320-1660	276-287	1560-2000
Robinson Helicopter Co.	R22*	2	468	208	—
United Technologies Corp. Sikorsky Aircraft Div.	S-58T Series	14-16	4923-5370	282	5000
	S-62A	13	2967	453	3000
	S-61L (MARK II) Airliine	30	7208	305	6500
	S-61 (MARK II) Payloader	2	11,600	305	11,000
	S-61N (MARK II)	26-28	7990	490	6000
	S-76 (MARK II)*	14	4525	466	4200

Source: Aerospace Industries Association, "Directory of Helicopter Operators in the United States, Canada, Mexico and Puerto Rico, 1982/83 "and "AIA Directory of VTOL Aircraft, 1982."
In production.

HELIPORTS AND HELISTOPS IN THE UNITED STATES, CANADA AND PUERTO RICO

By Region
Selected Years 1972-1981[a]

Region	1972	1973	1975	1977	1981[a]
TOTAL	2,326	2,384	3,268	3,433	3,985
Elevated Facilities	211	241	277	299	319
New England	87	78	143	164	168
Middle Atlantic	571	581	684	795	727
East North Central	281	307	411	397	718
West North Central	109	110	98	107	164
South Atlantic	190	204	352	306	416
East South Central	65	64	107	144	203
West South Central	216	217	338	339	409
Mountain	168	176	241	213	268
Pacific	545	551	789	821	734
Puerto Rico	24	24	30	73	71
Canada	70	72	75	74	107

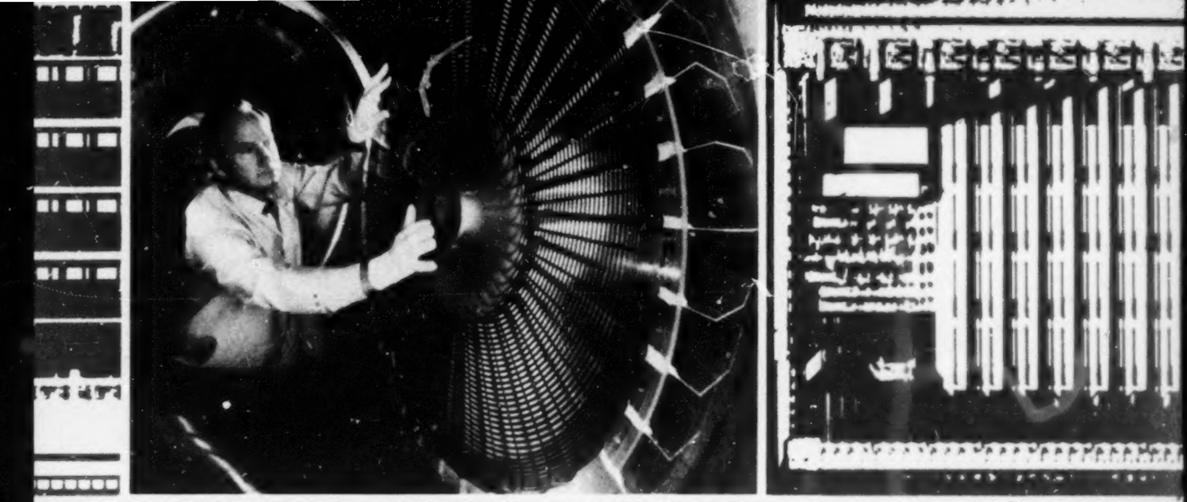
Source: Aerospace Industries Association, "Directory of Heliports in the U.S., Canada, Puerto Rico, 1981."
NOTE: Totals include proposed facilities.
a Latest available data.

HOSPITAL HELIPORTS IN THE UNITED STATES, CANADA AND PUERTO RICO

By Region
Selected Years 1972-1981[a]

Region	1972	1973	1975	1977	1981[a]
TOTAL	354	384	565	699	905
New England	5	5	16	21	31
Middle Atlantic	43	42	55	73	93
East North Central	82	99	126	150	193
West North Central	22	21	22	29	69
South Atlantic	39	50	76	82	135
East South Central	18	18	29	54	171
West South Central	26	26	59	67	77
Mountain	29	32	56	67	88
Pacific	87	87	119	147	135
Puerto Rico	—	—	—	2	2
Canada	3	4	7	7	11

Source: Aerospace Industries Association, "Directory of Heliports in the U.S., Canada, Puerto Rico, 1981."
NOTE: Totals include proposed facilities.
a Latest available data.



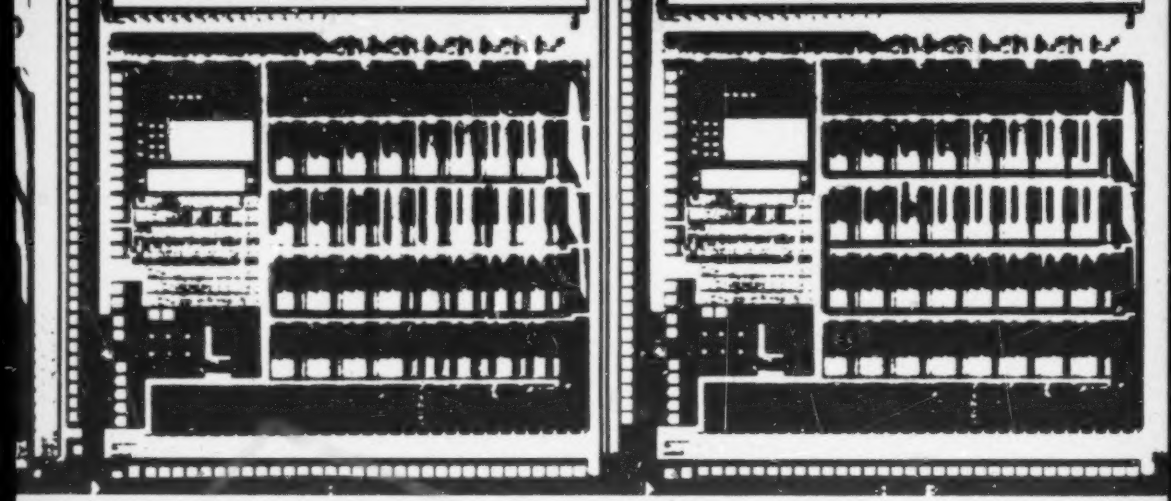
RESEARCH AND DEVELOPMENT

In 1982, funding for aerospace research and development remained at approximately the previous year's level in real terms, but it will decline in 1983, according to estimates compiled by the Battelle Memorial Institute. The Institute's report shows an overall aerospace industry figure of $12.2 billion, compounded of $9 billion in government funding and $3.2 billion in company money; the total compares with $11.7 billion reported by the National Science Foundation (NSF) for 1981. The Battelle Institute's aerospace industry estimate for 1983 is $11.8 billion, of which $9.4 billion will be federally funded and $2.4 billion company funded.

The aerospace industry R&D trend lags behind the experience of all U.S. industries. NSF reported a 1982 all-industry figure of $57.9, a substantial real increase above 1981's $51.8 billion. For 1983, NSF estimates the all-industry total at $64.3 billion, which represents an increase of 11 percent in current dollars, as opposed to the predicted aerospace industry decline of 3.4 percent.

The $11.8 billion total estimated for aerospace research and development expenditures in 1983 will put the industry in second place among industries with the greatest R&D expenditures, with outlays running about $1.1 billion behind the electrical machinery and communications industry. Other R&D-intensive industries, according to the Battelle survey, include general machinery, whose R&D funding for 1982 is estimated at $9.1 billion; autos, trucks and parts, $7.2 billion; and chemicals, $6.8 billion. Battelle's estimate for the all-industry 1983 total—$60.7 billion—is somewhat lower than NSF's.

Budget data show that federal outlays for R&D dipped slightly—in real terms—in Fiscal Year 1982, advanced moderately in FY 1983, and will increase significantly in FY 1984. Overall federal outlays in FY 1982 amounted to $34.5 billion, compared with $34.3 billion in FY 1981; the apparent increase was actually a 5.9 percent decline after adjustment for inflation. In FY 1983, federal outlays total $37.7 billion, a 4.2 percent real increase over the previous year. The Administration's budget plan contemplates federal R&D outlays of



$42.7 billion in FY 1984; that would amount to a real increase of more than 7.5 percent above FY 1983.

Department of Defense outlays in FY 1982 were $18.2 billion, up 8.2 percent in real terms over the previous year. In FY 1983, outlays are estimated at $21.8 billion, up over 14 percent in real terms. The projection for FY 1984—$26.8 billion—represents a further 17 percent real increase.

Budget data show NASA R&D funding declining sharply from FY 1982 through FY 1984. However, a good part of this decline is simply bookkeeping, involving transfer of much of the Space Shuttle funding from R&D to the operations account. In those terms, NASA funding was $3.2 billion in FY 1982, and $2.4 billion in FY 1983; it is projected to remain at the latter level in FY 1984.

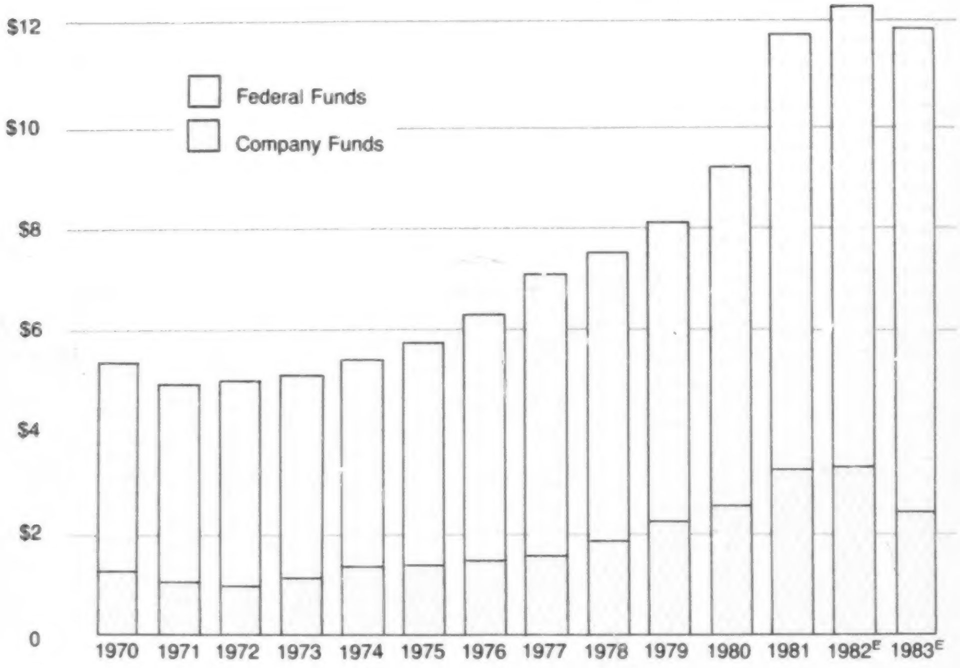
Federal budget authority for aeronautical R&D totaled $3.5 billion in FY 1982, up from $3.3 billion in FY 1981. The FY 1982 breakdown included $3 billion for the Department of Defense, $474 million for NASA and $81 million for the Department of Transportation. In FY 1983, the total is estimated at $4.3 billion, a 21 percent increase in current dollars, but practically all of it is in DoD budget authority ($3.7 billion). The FY 1983 figure for NASA is $486 million, for DoT $134 million. The FY 1984 budget, however, contemplates a major boost in NASA aeronautical R&D.

The number of scientists and engineers engaged in aerospace R&D activities in 1982 was 95,300, practically the same as in the previous year (95,200). For all industries in the U.S., the figure was 511,600. Aerospace R&D employment of scientists and engineers amounted to 18.6 percent of the total.

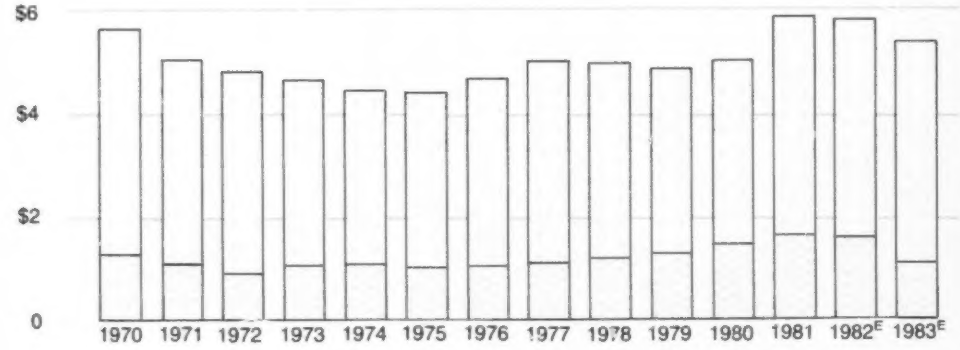
A National Science Foundation analysis of industrial R&D spending in relation to net sales shows that the aerospace industry's R&D funding far outpaces the average for all manufacturing industries. In 1981, the latest year for which information is available, aerospace company funding of R&D amounted to 4.2 percent of net sales, compared with two percent for all manufacturing industries. Total aerospace R&D funding—company plus government—was 15.3 percent of net sales; the comparable all-industry figure was 2.9 percent.

AEROSPACE INDUSTRY FUNDS FOR RESEARCH AND DEVELOPMENT

(Billions of Current Dollars)



(Billions of Constant Dollars—1972 = 100)



Source: Aerospace Industries Association

FUNDS FOR RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1971-1983
(Millions of Dollars)

Year	All Industries[a]			Aerospace Industry[b]		
	Total	Federal Funds	Company Funds[c]	Total	Federal Funds	Company Funds[c]
CURRENT DOLLARS						
1971	$18,320	$ 7,666	$10,654	$ 4,881	$3,864	$1,017
1972	19,552	8,017	11,535	4,950	3,970	978
1973	21,249	8,145	13,104	5,052	3,899	1,154
1974	22,887	8,220	14,667	5,278	4,000	1,278
1975	24,187	8,605	15,582	5,713	4,428	1,285
1976	26,997	9,561	17,436	6,339	4,921	1,418
1977[p]	29,825	10,485	19,340	7,033	5,486	1,547
1978[p]	33,304	11,189	22,115	7,536	5,713	1,823
1979[p]	38,226	12,518	25,708	8,041	5,840	2,201
1980[p]	44,505	14,029	30,476	9,198	6,628	2,570
1981[p]	51,830	16,468	35,362	11,702	8,501	3,201
1982[E]	57,850	18,525	39,325	12,244[d]	9,055	3,187
1983[E]	64,250	20,675	43,575	11,829[d]	9,429	2,400
CONSTANT DOLLARS (1972 = 100)[e]						
1971	$19,081	$ 7,985	$11,097	$ 5,084	$4,025	$1,059
1972	19,552	8,017	11,535	4,950	3,970	978
1973[r]	20,094	7,702	12,391	4,777	3,687	1,091
1974[r]	19,888	7,143	12,745	4,586	3,476	1,111
1975[r]	19,228	6,841	12,387	4,542	3,520	1,022
1976[r]	20,400	7,225	13,175	4,790	3,718	1,071
1977[p]	21,296	7,487	13,809	5,022	3,917	1,105
1978[p]	22,141	7,439	14,702	5,010	3,798	1,212
1979[p]	23,391	7,660	15,731	4,920	3,574	1,347
1980[p]	24,913	7,853	17,060	5,149	3,710	1,439
1981[p]	26,510	8,423	18,087	5,985	4,348	1,637
1982[E]	27,916	8,939	18,976	5,908	4,370	1,538
1983[E]	29,459	9,480	19,979	5,424	4,323	1,100

Source: National Science Foundation, for historical data and All Industries estimates; Battelle Memorial Institute, "Probable Levels of R&D Expenditures. . . . Forecast and Analysis," (Annually) for Aerospace Industry estimates.

NOTE: Detail may not add to totals because of rounding.

[a] Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.

[b] Companeis classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

[c] Company funds include all funds for industrial R&D work performed within company facilities except funds provided by the Federal Government. Excluded are company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

[d] The Battelle estimates for All Industries are $54,967 million for 1982 and $60,664 million for 1983.

[e] Based on GNP implicit price deflator.

[p] Preliminary data for major revision resulting from selection of new survey sample.

[r] Revised

[E] Estimate.

FUNDS FOR RESEARCH AND DEVELOPMENT IN AEROSPACE

By Type of Research and Fund Source
Calendar Years 1960-1981[a]
(Millions of Dollars)

YEAR	TOTAL AERO-SPACE	Applied Research and Development Funds			Basic Research Funds		
		TOTAL	Federal Govern-ment Contracts	Company	TOTAL	Federal Govern-ment Contracts	Company
1960	$ 3,514	$ 3,452	$3,118	$ 334	$ 62	$32	$30
1961	3,829	3,789	3,417	372	40	20	20
1962	4,042	3,987	3,558	429	55	30	25
1963	4,712	4,653	4,229	424	59	31	28
1964	5,078	5,010	4,585	424	68	35	33
1965	5,148	5,074	4,457	617	74	42	32
1966	5,526	5,452	4,685	767	74	39	35
1967	5,669	5,596	4,497	1,099	73	34	39
1968	5,765	5,694	4,508	1,185	70	25	45
1969	5,882	5,816	4,500	1,313	65	23	42
1970	5,219	5,156	3,985	1,170	63	20	43
1971	4,881	4,831	3,848	983	50	16	34
1972	4,950	4,887	3,949	937	62	21	41
1973	5,052	4,992	3,871	1,118	58	20	38
1974	5,278	5,221	3,895	1,236	57	18	39
1975	5,713	5,659	4,416	1,243	54	18	36
1976	6,339	6,285	4,899[E]	1,386[E]	54	22[E]	32[E]
1977[p]	7,033	6,978	5,461[E]	1,517[E]	55	22[E]	33[E]
1978[p]	7,536	NA	NA	NA	NA	NA	NA
1979[p]	8,041	7,953	5,811[E]	2,142[E]	88	45[E]	43[E]
1980[p]	9,198	NA	NA	NA	NA	NA	NA
1981[p]	11,702	11,574	8,443	3,131	128	59	69

Source: National Science Foundation.
NOTE: Detail may not add to totals because of rounding.
[a] Latest year available.
[p] Preliminary data for major revision reflecting selection of new survey sample.
[E] Estimated by AIA.
NA Not available; details on sources and application of funds available only for odd-numbered years.

RESEARCH AND DEVELOPMENT FUNDS AS PERCENT OF NET SALES ALL MANUFACTURING INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1967-1981

Year	All Manufacturing Industries[a]		Aerospace Industry[b]	
	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales	Total R&D Funds as Percent of Net Sales	Company R&D Funds as Percent of Net Sales
1967	4.2%	2.1%	19.7%	4.0%
1968	4.0	2.1	19.0	4.1
1969	4.0	2.2	20.2	4.6
1970	3.7	2.2	16.2	3.8
1971	3.5	2.1	16.2	3.4
1972	3.4	2.0	16.6	3.3
1973	3.3	2.0	13.3	3.0
1974	3.1	2.0	14.1	3.5
1975	3.1	2.0	12.7	2.8
1976	3.1	2.0	12.7	2.8
1977[p]	3.1	2.0	13.3	2.9
1978[p]	3.0	2.0	13.3	3.2
1979[p]	2.8	1.9	12.9	3.5
1980[p]	2.8	1.9	13.7	3.8
1981[p]	2.9	2.0	15.3	4.2

Source: National Science Foundation.

[a] Includes all manufacturing industries known to conduct or finance research and development.

[b] Companeis classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

[p] Preliminary data for major revision resulting from selection of new survey sample.

FUNDS FOR ENERGY RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1978-1982 (Millions of Dollars)

	1978	1979	1980	1981	1982[E]
All Industries[a]—TOTAL	$3,026	$3,795	$4,162	$4,270	$3,903
Federal Funds	1,193	1,497	1,563	1,521	NA
Company Funds	1,833	2,298	2,599	2,749	NA
Aerospace Industry[b]—**TOTAL**	$ 283	$ 372	$ 446	$ 432	$ 300
Federal Funds	215	259	283	287	NA
Company Funds	68	113	163	145	NA

Source: National Science Foundation.

[a] Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.

[b] Companeis classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

NA Not available.

[E] Estimated by surveyed companies.

EXPENDITURES FOR POLLUTION ABATEMENT RESEARCH AND DEVELOPMENT ALL INDUSTRIES AND THE AEROSPACE INDUSTRY

Calendar Years 1978-1982
(Millions of Dollars)

	1978	1979	1980	1981	1982[E]
All Industries[a]	$1,054	$1,237	$1,202[r]	NA	NA
Aerospace Industry[b]	64	64	38	$33	$34

Source: National Science Foundation.

a Includes all manufacturing industries, plus those non-manufacturing industries known to conduct or finance research and development.

b Companeis classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

E Estimate.

r Revised.

NA Not available.

FEDERAL AERONAUTICS RESEARCH AND DEVELOPMENT

Budget Authority
Fiscal Years 1969-1983
(Millions of Dollars)

Year	TOTAL	NASA[a]	DOD[b]	DOT[c]
1969	$1,300	$169	$1,161	$(30)[d]
1970	1,882	199	1,641	42
1971	1,990	210	1,707	73
1972	2,295	236	1,964	95
1973	2,187	313	1,799	75
1974	2,030	278	1,678	74
1975	2,015	314	1,627	74
1976	2,351	325	1,941	85
Tr. Qtr.	584	83	480	22
1977	2,727	378	2,256	93
1978	3,338	437	2,807	94
1979	2,850	519	2,240	91
1980	2,991	560	2,336	95
1981	3,286	526	2,653	106
1982[E]	3,538	474	2,984	81
1983[E]	4,284	486	3,664	134

Source: NASA, "Aeronautics and Space Report of the President" (Annually).

NOTE: Latest available data, based on proposed FY 1983 Federal budget.

a Research and Development, Construction of Facilities, Research and Program Management.

b Research, Development, Testing and Evaluation of aircraft and related equipment.

c Federal Aviation Administration Research, Engineering and Development, and Facilities, Engineering and Development.

d Unobligated balances for SST research and development, rescinded in 1969.

E Estimate.

FEDERAL OUTLAYS FOR CONDUCT OF RESEARCH AND DEVELOPMENT

Fiscal Years 1970-1984
(Millions of Dollars)

Year	TOTAL	DOD	NASA	Energy[a]	Other
CURRENT DOLLARS					
1970	$15,632	$ 7,568	$3,753	$1,616	$2,695
1971	15,050	7,541	3,382	1,303	2,824
1972	16,629	8,275	3,422	1,552	3,380
1973	17,407	8,574	3,315	1,623	3,895
1974	18,239	8,956	3,256	1,825	4,202
1975	19,525	9,341	3,266	2,277	4,641
1976	20,233	9,329	3,521	2,225	5,158
1977	22,462	10,176	3,763	3,181	5,342
1978	24,532	10,726	3,833	3,925	6,048
1979	26,578	11,454	4,064	4,413	6,648
1980	30,351	13,451	4,711	4,698	7,492
1981	34,252	15,720	5,279	5,121	8,132
1982	34,509	18,201	3,220	4,974	8,114
1983[E]	37,735	21,847	2,386	5,012	8,492
1984[E]	42,741	26,844	2,421	4,911	8,563
CONSTANT DOLLARS (1972 = 100)[b]					
1970	$17,163	$ 8,309	$4,121	$1,774	$2,959
1971	15,738	7,886	3,537	1,363	2,953
1972	16,629	8,275	3,422	1,552	3,380
1973	16,665	8,209	3,174	1,554	3,729
1974	16,270	7,989	2,905	1,628	3,748
1975	15,832	7,574	2,648	1,846	3,763
1976	15,341	7,073	2,670	1,687	3,911
1977	15,959	7,230	2,674	2,260	3,795
1978	16,322	7,136	2,550	2,611	4,024
1979	16,257	7,006	2,486	2,699	4,066
1980	17,061	7,561	2,648	2,641	4,211
1981	17,535	8,048	2,702	2,622	4,163
1982	16,505	8,705	1,540	2,379	3,881
1983[E]	17,190	9,952	1,087	2,283	3,868
1984[E]	18,484	11,609	1,047	2,124	3,703

Source: "The Budget of the United States Government," (Annually).

NOTE: Detail may not add to totals because of rounding.

[a] Energy research and development programs transferred from AEC to ERDA with 1974 reorganization and to Dept. of Energy in 1977, was proposed to be funded through the Energy Research and Technology Administration of the Dept. of Commerce in the FY1983 Budget, and appears in the FY1984 Budget as "Energy Related Activities currently in the Department of Energy."

[b] Based on Fiscal Year GNP implicit price deflator.

[E] Estimate.

DEPARTMENT OF DEFENSE APPROPRIATIONS FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1982-1984
(Millions of Dollars)

	1982	1983^E	1984^E
TOTAL—APPROPRIATIONS FOR RDT&E	$20,103	$22,805	$29,622
BY APPROPRIATION			
Army	3,620	3,885	4,792
Navy	5,835	6,086	8,181
Air Force	8,898	10,626	13,652
Defense Agencies	1,698	2,153	2,940
Director of Test & Evaluation, Defense	53	55	57
BY RESEARCH CATEGORIES			
Research	697	779	850
Exploratory Development	2,235	2,434	2,693
Advanced Development	3,449	3,852	6,365
Engineering Development	7,693	8,641	10,518
Management and Support	2,032	2,201	2,372
Operational Systems Development	3,996	4,898	6,823
RECAP OF BUDGET ACTIVITIES			
Technology Base	2,933	3,213	3,544
Advanced Technology Development	751	820	1,233
Strategic Programs	4,636	5,901	9,160
Tactical Programs	6,890	7,229	8,849
Intelligence and Communications	2,160	2,725	3,576
Defensewide Mission Support	2,732	2,917	3,260
RECAP OF FYDP PROGRAMS			
Strategic Forces	711	782	799
General Purpose Forces	875	1,145	1,692
Intelligence and Communications	2,372	2,942	4,291
Airlift/Sealift	24	11	12
Research and Development (FYDP Program 6)	16,106	17,907	22,799
Central Supply and Maintenance	11	14	22
Training, Medical and Other	1	—	3
Support of Other Nations	3	5	5

Source: Department of Defense Budget (Annually).
NOTE Detail may not add to totals because of rounding.
E Estimate.

DEPARTMENT OF DEFENSE
OUTLAYS FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1970-1984
(Millions of Dollars)

By Function

Year	TOTAL, All RDT&E Functions	Aircraft	Missiles	Astronautics	Other
1970	$ 7,166	$ 1,239	$2,196	$ 753	$2,978
1971	7,303	1,699	2,008	519	3,077
1972	7,881	2,066	2,157	468	3,190
1973	8,157	2,036	2,038	512	3,571
1974	8,582	1,893	2,160	561	3,968
1975	8,866	1,698	2,176	515	4,477
1976	8,923	1,603	2,295	581	4,444
Tr. Qtr.	2,206	410	520	129	1,147
1977[a]	9,795	2,176	2,259	537	4,823

By Agency

Year	TOTAL, All RDT&E Functions	Air Force	Navy	Army	Other
1970	$ 7,166	$ 2,937	$2,084	$1,665	$ 480
1971	7,303	2,809	2,405	1,569	520
1972	7,881	3,205	2,427	1,779	470
1973	8,157	3,362	2,404	1,912	479
1974	8,582	3,240	2,623	2,190	529
1975	8,866	3,308	3,021	1,964	573
1976	8,923	3,338	3,215	1,842	528
Tr. Qtr.	2,203	830	778	437	161
1977	9,795	3,618	3,481	2,069	627
1978	10,508	3,626	3,825	2,342	715
1979	11,152	4,080	3,826	2,409	837
1980	13,127	5,017	4,382	2,707	1,021
1981	15,278	6,341	4,783	2,958	1,196
1982	17,729	7,794	5,240	3,230	1,465
1983[E]	21,430	9,870	5,901	3,666	1,993
1984[E]	26,332	12,257	7,139	4,364	2,572

Source: Department of Defense Budget (Annually).

[a] Data no longer available in this format.

[E] Estimate.

DEPARTMENT OF DEFENSE PRIME CONTRACT AWARDS[a] FOR RESEARCH, DEVELOPMENT, TEST AND EVALUATION

Fiscal Years 1978-1982
(Millions of Dollars)

Program Categories	1978	1979	1980	1981	1982
TOTAL—RDT&E	$8,683	$8,545	$9,470	$10,483	$14,882
Research	323	382	648	694	685
Exploratory Development	780	726	868	1,081	1,285
Other Development	6,895	6,327	6,920	8,233	12,537
Management & Support	685	1,110	1,034	474	375
Aircraft—TOTAL	$1,640	$1,315	$1,171	$ 739	$ 2,906
Research	2	8	3	4	14
Exploratory Development	43	25	39	58	139
Other Development	1,591	1,268	1,126	672	2,740
Management & Support	4	13	3	6	13
Missile and Space Systems—TOTAL	2,721	3,064	3,363	4,603	5,648
Research	20	13	36	27	14
Exploratory Development	178	137	173	277	322
Other Development	2,415	2,530	2,800	4,184	5,265
Management & Support	108	384	354	115	48
Electronics & Communications Equipment—TOTAL	1,765	1,893	2,417	2,582	3,534
Research	37	56	67	74	77
Exploratory Development	156	226	260	305	351
Other Development	1,476	1,499	1,977	2,110	3,049
Management & Support	96	112	113	93	57
All Other—TOTAL[b]	2,557	2,271	2,519	2,558	2,794
Research	264	304	542	589	581
Exploratory Development	403	338	396	441	473
Other Development	1,413	1,029	1,017	1,268	1,482
Management & Support	477	600	564	260	257

Source: Department of Defense, "Prime Contract Awards by Service Category and Federal Supply Classification" (Annually).
NOTE: Detail may not add to totals because of rounding.

[a] Effective FY 1980, data include DOD contract awards for civil functions; data for prior years limited to military prime contract awards.

[b] "All Other" includes ships, tank-automative, weapons, ammunition, services, and other.

DEPARTMENT OF DEFENSE PRIME CONTRACT AWARDS OVER $10,000[a] FOR RESEARCH, DEVELOPMENT, TEST & EVALUATION

By Region and Type of Contractor
Fiscal Year 1982

REGION	TOTAL	Type of Contractor		
		Educational Institutions	Other Non-Profit Institutions[a]	Business Firms
TOTAL—Millions of Dollars ...	$14,757	$852	$683	$13,223
New England	1,481	244	214	1,022
Middle Atlantic	1,261	59	16	1,186
East North Central	577	59	29	489
West North Central	981	9	1	971
South Atlantic	2,046	317	102	1,627
East South Central	184	5	5	174
West South Central	486	24	11	451
Mountain	982	46	2	935
Pacific[b]	6,759	88	303	6,368
PERCENT OF TOTAL	100.0%	100.0%	100.0%	100.0%
New England	10.0	28.7	31.4	7.7
Middle Atlantic	8.5	7.0	2.3	9.0
East North Central	3.9	6.9	4.3	3.7
West North Central	6.6	1.0	0.2	7.3
South Atlantic	13.9	37.2	14.9	12.3
East South Central	1.2	0.6	0.7	1.3
West South Central	3.3	2.8	1.7	3.4
Mountain	6.7	5.4	0.2	7.1
Pacific[b]	45.8	10.4	44.2	48.2

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).
NOTE: Detail may not add to totals because of rounding.
[a] Includes contracts with other government agencies.
[b] Includes Alaska and Hawaii.

MISSILE PROGRAMS
RESEARCH, DEVELOPMENT, TEST AND EVALUATION[a]

By Agency, Type and Model
Fiscal Years 1982, 1983 and 1984
(Millions of Dollars)

Agency, Type and Model	1982	1983[E]	1984[E]
AIR FORCE			
ALCM	$ 99.9	$ 19.3	$ 28.5
AMRAAM[b]	136.5	206.5	188.6
*ASMS	99.6	49.7	97.5
GLCM	80.1	28.6	36.5
IR Maverick	14.6	5.4	0.6
Minuteman II/III	19.3	11.1	5.0
Peacekeeper (M-X)	1,899.7	2,505.8	3,378.4
Target Drones	12.5	—	—
NAVY			
Harm[b]	$ 25.2	$ 11.7	$ 17.9
Laser Maverick	2.0	1.0	2.0
Phoenix	31.5	22.8	4.0
RAM	17.9	16.2	4.6
Sidewinder	0.6	—	—
Sparrow	0.5	—	—
Standard	51.0	50.8	40.2
Tomahawk	144.5	108.9	135.7
Trident I	41.5	14.7	2.6
*Trident II	240.8	369.6	1,496.4
ARMY			
Copperhead	$ 2.7	$ —	$ —
Laser Hellfire[c]	32.3	16.3	0.5
MLRS	23.1	23.1	1.0
Patriot	55.8	46.9	84.6
Pershing II	150.7	111.0	22.8
Roland	1.0	—	—
Stinger	16.1	—	—
TOW 2	6.2	2.0	2.0
*Ballistic Missile Defense Advanced Technology Program	126.5	142.8	170.9
*Ballistic Missile Defense Systems Technology Program (BMDSTP)	335.6	376.2	538.4
*Joint Tactical Missile System (JTACMS)[d]	11.9	29.3	60.1
*Remotely Piloted Vehicles (RPVs)	76.6	77.7	138.1

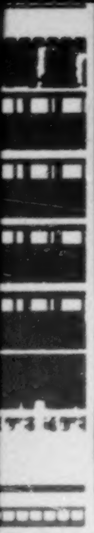
Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).
NOTE: See Missile Programs Chapter for missile program procurement authorization data.
E Estimate.
a Total Obligational Authority.
b Navy and Air Force funding.
c Army and Navy funding.
d Army, Navy and Air Force funding.
* Programs in R&D only.

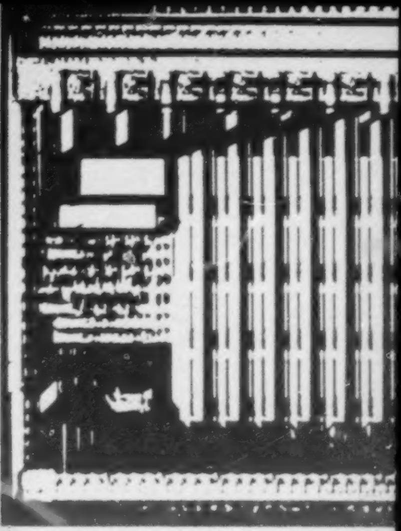
MILITARY AIRCRAFT PROGRAMS RESEARCH, DEVELOPMENT, TEST AND EVALUATION[a]

By Agency, Type and Model
Fiscal Years 1982, 1983 and 1984
(Millions of Dollars)

Agency, Type and Model	1982	1983[E]	1984[E]
AIR FORCE			
A-10 A/B Thunderbolt II	$ 16.6	$ 5.0	$ 2.7
B-1B	471.0	753.5	749.9
B-52H Cruise Missile Carrier Aircraft Modification	21.9	60.2	41.5
B-52 G/H Avionics Modernization	25.2	13.7	2.6
C-5A Wing Modification	9.0	7.6	4.8
E-3A (AWACS)	51.8	67.0	69.1
European Distrib. System Aircraft (EDSA)	—	2.6	8.5
EF-111A Modification	9.2	22.0	—
F-15 Eagle	32.3	112.8	117.8
F-16 Multimission Fighter Falcon	57.3	73.5	107.4
KC-135 Re-engining/Modernization	24.9	26.3	8.3
LANTIRN (Night Precision Attack)	84.3	99.9	90.0
Precision Location Strike System (PLSS)	79.5	78.7	69.7
Tactical Fighter Derivative Aircraft	—	—	104.7
T-46A Next Generation Trainer	14.6	51.6	123.5
*Advanced Tactical Fighter[b]	23.0	37.4	162.3
*Aircraft Engine Component Improvement Program[b]	121.9	117.3	142.0
*Joint Services Advanced Vertical Lift Aircraft (JVX)[c]	—	—	96.8
NAVY			
A-6E Intruder	$ 9.9	$ 4.7	$ 6.7
AV-8B	231.4	113.8	118.2
CH-53E Super Stallion	11.1	11.1	32.9
E-2C Hawkeye	18.1	52.2	54.4
EA-6B Prowler	10.7	12.6	23.8
F-14A Tomcat	19.7	21.7	45.7
F-18 Hornet	194.0	109.2	27.2
P-3C Orion	22.5	18.6	19.9
SH-2F Seasprite (LAMPS MK-I)	7.6	9.0	6.4
SH-60B Seahawk LAMPS	70.9	9.0	4.4
VTXTS (FCLP)	5.0	7.9	30.3
ECX	1.0	37.2	71.8
FEWSG	4.7	3.7	6.4
ARMY			
AH-1S Cobra/Tow	$ 14.0	$ 8.6	$ —
AH-64 Attack Helicopter	91.9	33.6	28.3
UH-60A Blackhawk	6.7	5.6	3.3

Source: "Program Acquisition Costs by Weapon System," Department of Defense Budget (Annually).
NOTE: See Aircraft Production Chapter for aircraft program procurement authorization data.
[a] Total Obligational Authority.
[b] Air Force and Navy.
[c] Air Force, Navy and Marine Corps.
[E] Estimate.
* Programs in R&D only.





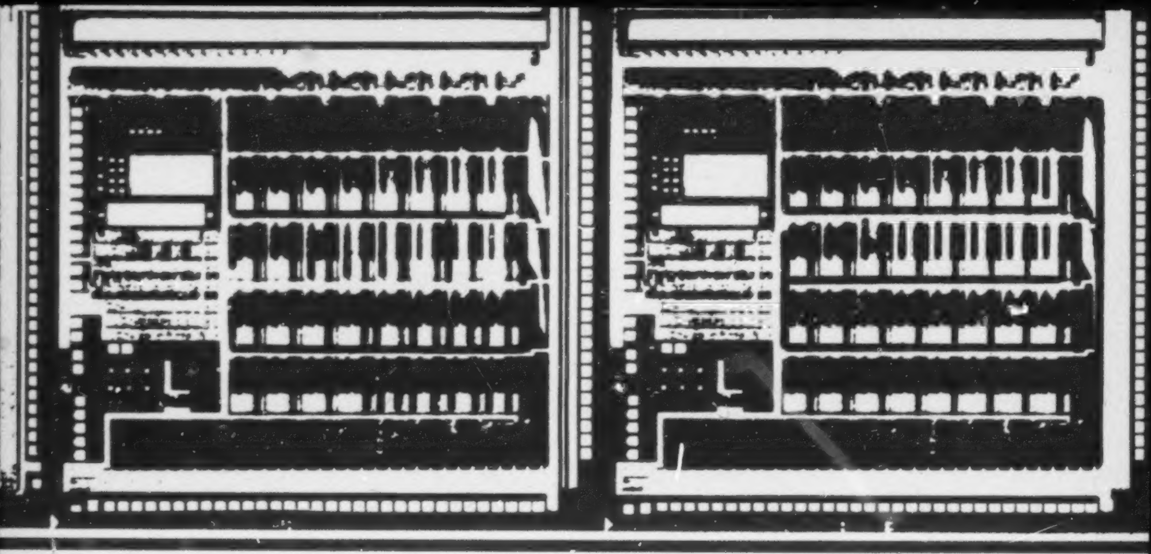
FOREIGN TRADE

In 1982, the United States experienced an international trade deficit of $35.2 billion, an all-time high and the seventh straight deficit. In comparison with the overall picture, the aerospace industry recorded a strong trade performance, with a high level of exports ($15.6 billion) and a good trade balance ($11.2 billion).

However, both the aerospace export and trade balance figures were approximately $2 billion below the previous year's levels, the first decline in either category in five years. But the decline was not considered indicative of a long-term trend, rather a temporary consequence of reduced orders in prior years for commercial transport aircraft, due to the financial difficulties of the world's airlines. Examination of the statistics shows that the drop in export volume was entirely in civil aircraft sales, particularly transports, while military exports increased by some 39 percent. Anticipated recovery by the airlines will boost civil exports, although the gain will not be reflected immediately in sales figures; sales are based on deliveries, which can lag two or more years behind order placements.

The $15.6 billion in aerospace exports compares with $17.6 billion in 1981, which was a record year, but the 1982 figure is higher than any other year in history. It was compounded of $9.6 billion in civil exports and $6 billion in military exports, the latter figure an all-time high. Exports of complete civil aircraft dropped by $3.8 billion from the previous year's level; this reduction accounted for 82 percent of the year's drop in total shipments of civil aircraft.

Despite the sharp decline, foreign sales of commercial transports accounted for the greatest dollar value among aerospace exports; the figure was $3.8 billion, down from $7.2 billion in 1981. In terms of numbers, the industry exported 121 large commercial transports, compared with 255 in the previous year. Export sales of general aviation aircraft declined in dollar value from $790 million in 1981 to $517 million in 1982, and in numbers from 2,617 planes to 940. Helicopter sales fell from $346 million to



$206 million, in units delivered from 453 to 254. Aircraft engine sales dipped from $784 million to $763 million.

Aircraft parts and accessories shipped abroad amounted to $2.9 billion and aircraft engine parts $1.1 billion; the $4 billion total for parts represented the only increase over the previous year among civil export sub-categories.

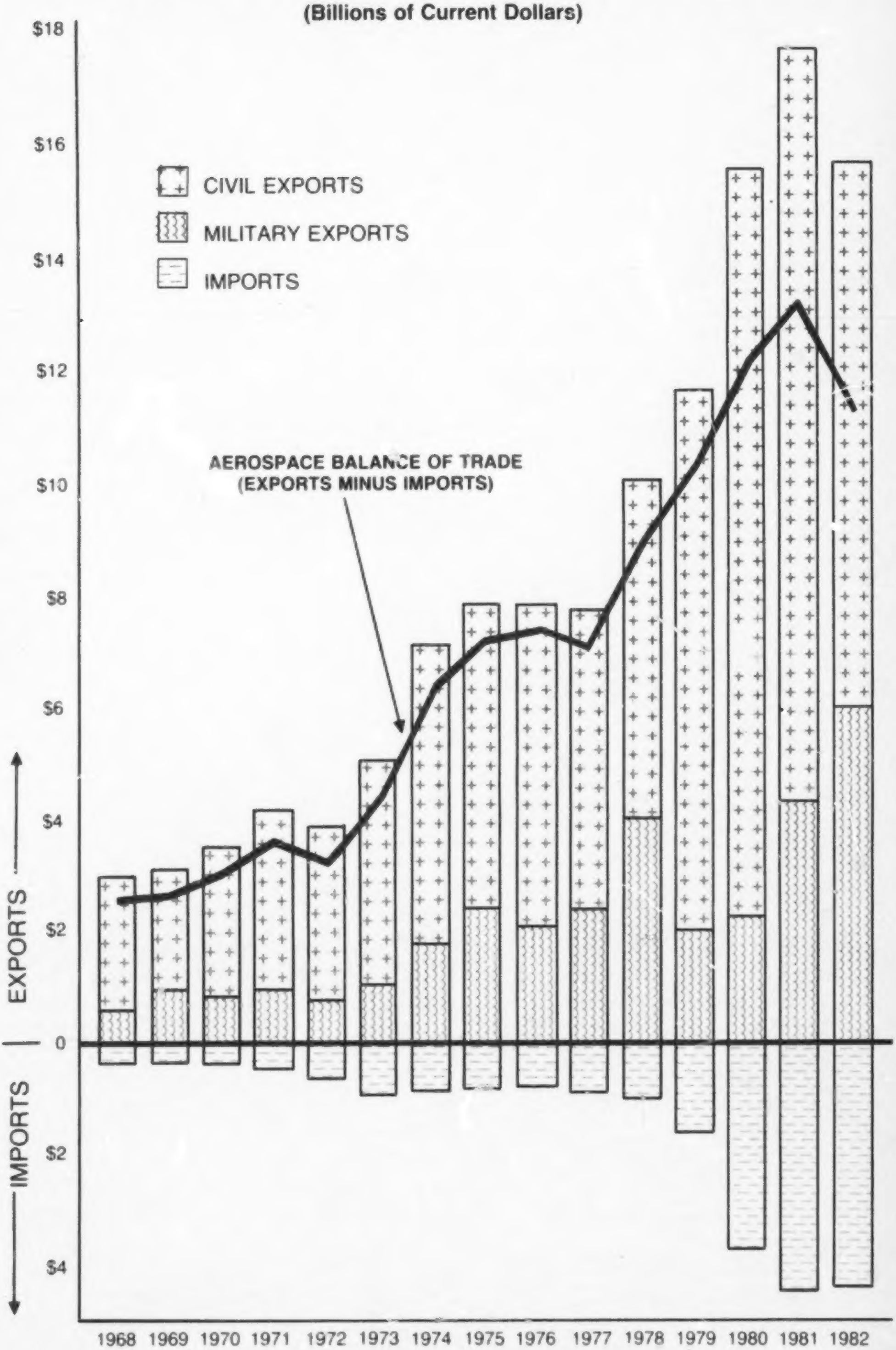
At $2.4 billion, deliveries of complete aircraft accounted for the largest dollar value among military exports; the figure compares with $1.7 billion in 1981. More than half of the 1982 complete aircraft dollar value was in the fighter/fighter-bomber category. In terms of numbers, military aircraft shipments totaled 637, up 129 units. Shipments of aircraft and engine parts totaled $2.3 billion (up from $2 billion in 1981) and deliveries of missiles, rockets and parts amounted to $1.1 billion, more than double the previous year's level.

A matter of concern to the aerospace industry and the U.S. economy is the continuing high level of aerospace sales to U.S. customers by foreign manufacturers. Although aerospace imports declined, the dip was slight and the import total remained close to 1981's record level of $4.5 billion (the 1982 figure was only $70 million less).

The largest component of the import volume was aircraft parts, civil and military; sales volume in this category was $1.6 billion, compared with $1.4 billion in the previous year. Imports of aircraft engines and parts totaled $1.3 billion (down from $1.5 billion) and imports of complete civil and military aircraft amounted to $1.2 billion (down from $1.4 billion). Virtually all of the aircraft import dollar value was in civil aircraft ($1.1 billion) and sales of general aviation planes predominated ($838 million). In terms of the dollar value of sales of general aviation aircraft to U.S. customers, the leading nation was Canada ($307 million), followed by France ($223 million), the United Kingdom ($144 million), Israel ($73 million), Brazil ($40 million) and Japan ($38 million).

AEROSPACE EXPORTS, IMPORTS, AND TRADE BALANCE

(Billions of Current Dollars)



Source: Aerospace Industries Association

TOTAL AND AEROSPACE BALANCE OF TRADE

Calendar Years 1960-1982
(Millions of Dollars)

Year	TOTAL U.S. Trade Balance[a]	Aerospace			Aerospace Trade Balance as Percent of U.S. Total
		Trade Balance	Exports	Imports	
1960	$ 5,369	$ 1,665	$ 1,726	$ 61	31.0%
1961	6,096	1,501	1,653	152	24.6
1962	4,180	1,795	1,923	128	42.9
1963	6,061	1,532	1,627	95	25.3
1964	7,555	1,518	1,608	90	20.1
1965	5,875	1,459	1,618	159	24.8
1966	4,524	1,370	1,673	303	30.3
1967	4,409	1,961	2,248	287	44.5
1968	1,133	2,661	2,994	333	234.9
1969	1,599	2,831	3,138	307	177.0
1970	2,834	3,097	3,405	308	109.3
1971	(2,024)[b]	3,830	4,203	373	(c)
1972	(6,351)	3,230	3,795	565	(c)
1973	1,222	4,360	5,142	782	356.8
1974	(2,996)	6,350	7,095	745	(c)
1975	9,630	7,045	7,792	747	73.2
1976	(7,786)	7,267	7,843	576	(c)
1977	(28,970)	6,850	7,581	731	(c)
1978	(33,541)[r]	9,058	10,001	943	(c)
1979	(30,272)[r]	10,123	11,747	1,624	(c)
1980	(27,336)[r]	11,952	15,506	3,554	(c)
1981	(30,051)	13,134	17,634	4,500	(c)
1982	(35,182)	11,173	15,603	4,430	(c)

Source: Bureau of the Census, "Highlights of U.S. Export and Import Trade," Report FT990 (Monthly); "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually); "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

[a] U.S. Balance of Trade is the difference between exports of domestic merchandise, including Department of Defense shipments, and imports for consumption (customs value base).

[b] First negative U.S. Balance of Trade since 1888.

[c] Not applicable.

[r] Revised.

U.S. IMPORTS OF AEROSPACE PRODUCTS

Calendar Years 1978-1982
(Millions of Dollars)

	1978	1979	1980	1981	1982
TOTAL	$943.1	$1,624.3	$3,553.6	$4,500.4	$4,430.3
TOTAL AIRCRAFT	291.8	512.1	975.1	1,379.7	1,159.2
Civil Aircraft—TOTAL	284.5	508.6	969.1	1,336.2	1,128.3
Transports	58.1	199.8	285.5	195.5	93.7
General Aviation[a]	146.8	260.4	495.8	913.0	837.7
Helicopters	28.0	21.6	53.9	105.4	84.9
Other, Including Used	51.6	26.8	133.9	122.3	112.0
Military Aircraft	4.9	1.5	4.0	41.4	27.9
Gliders, Balloons & Airships	2.4	2.0	2.0	2.1	3.0
Civil	NA	NA	1.8	1.9	2.9
Military	NA	NA	0.2	0.2	0.1
TOTAL AIRCRAFT ENGINES & PARTS	283.0	547.0	1,097.4	1,465.0	1,318.5
Piston, Civil	1.6	4.0	11.0	5.1	10.4
Pist. Engs. & Parts, Mil.			1.1	0.1	0.4
Piston Engine Parts, Civil			8.3	7.2	4.2
Turbine, Civil	281.4	324.2	720.8	1,040.6	787.0
Turbine, Military			27.5	7.6	15.6
Turbine Engine Parts, Civil	NA	218.8	295.1	354.4	454.3
Turbine Engine Parts, Military	NA		34.1	50.0	46.6
TOTAL OTHER	368.3	565.2	1,481.1	1,655.7	1,952.6
Aircraft Parts, Civil	NA	NA	198.5	229.6	301.3
Non-Specified Parts, Civil	368.2	564.5	679.1	714.2	720.2
Aircraft Parts, Military			121.4	426.8	574.7
Other Parts, Military			136.8	64.8	26.0
Aircraft, Engs., & Parts Previously Exported from U.S.	NA	NA	345.2	220.0	330.2
Other	0.1	0.7	0.1	0.3	0.2

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports. TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

NOTE: Import classifications were revised as of 1980 data, with the total number of categories increased, and most former categories divided into military and civil items. Also effective 1980, import data include two new commodity groupings: civil aircraft parts, and aerospace products previously exported from the U.S.

[a] All fixed-wing aircraft under 33,000 pounds.

[b] Less than $50,000.

NA Not available.

U.S. IMPORTS OF COMPLETE AIRCRAFT

Calendar Years 1978-1982

	1978	1979	1980	1981	1982
TOTAL NUMBER OF AIRCRAFT	571	634	676	882	868
Civil Aircraft	362	393	580	733	648
Helicopters	74	91	177	213	184
Single-Engine	6	3	6	9	23
Multi-Engine Under 4400 lbs	47	5	6	2	13
Multi-Engine 4400-10,000 lbs	87	86	119	123	87
Multi-Engine 10,000-33,000 lbs	50	102	156	218	151
Multi-Engine Over 33,000 lbs	5	9	16	8	4
Used or Rebuilt	93	97	100	160	186
Military Aircraft	61	121	23	25	17
Gliders	148	120	73	124	203
Balloons & Airships	NA	NA	NA	NA	NA
TOTAL VALUE (Millions of Dollars)	$291.8	$512.1	$975.1	$1,379.7	$1,159.2
Civil Aircraft	284.5	508.6	969.1	1,336.2	1,128.3
Helicopters	28.0	21.6	53.9	105.4	84.9
Single-Engine	0.5	(*a*)	0.3	0.8	2.0
Multi-Engine Under 4400 lbs	2.8	0.4	1.2	0.1	1.7
Multi-Engine 4400-10,000 lbs	42.1	37.2	95.2	123.7	104.3
Multi-Engine 10,000-33,000 lbs	101.4	222.8	399.1	788.4	729.7
Multi-Engine Over 33,000 lbs	58.1	199.8	285.5	195.5	93.7
Used or Rebuilt	51.6	26.8	133.9	122.3	112.0
Military Aircraft	4.9	1.5	4.0	41.4	27.9
Gliders	2.1	1.6	1.5	1.6	2.6
Balloons & Airships	0.3	0.4	0.5	0.5	0.4

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT 246 (Annually).

(*a*) Less than $50,000.

NA Not available.

U.S. EXPORTS AND EXPORTS OF AEROSPACE PRODUCTS

Calendar Years 1960-1982
(Millions of Dollars)

Year	TOTAL Exports[a] of U.S. Merchandise	Exports of Aerospace Products				
		TOTAL	Percent of Total U.S. Exports	Civil		Military
				Transports	Other	
1960	$ 20,375	$ 1,726	8.5%	$ 480	$ 609	$ 637
1961	20,754	1,653	8.0	263	615	775
1962	20,431	1,923	9.4	259	651	1,013
1963	23,062	1,627	7.1	191	541	895
1964	26,156	1,608	6.1	211	553	844
1965	27,127	1,618	6.0	353	501	764
1966	29,884	1,673	5.0	421	614	638
1967	31,142	2,248	7.2	611	769	868
1968	34,199	2,994	8.8	1,200	1,089	705
1969	37,462	3,138	8.4	947	1,080	1,111
1970	42,590	3,405	8.0	1,283	1,233	889
1971	43,492	4,203	9.7	1,567	1,513	1,123
1972	48,959	3,795	7.8	1,119	1,835	841
1973	70,246	5,142	7.3	1,664	2,124	1,354
1974	97,144	7,095	7.3	2,655	2,618	1,822
1975	106,561	7,792	7.3	2,397	2,927	2,468
1976	113,666	7,843	6.9	2,468	3,209	2,166
1977	119,006	7,581	6.4	1,936	3,113	2,532
1978	141,228[r]	10,001	7.1	2,558	3,460	3,983
1979	178,798[r]	11,747	6.6	4,998	4,774	1,975
1980	216,672[r]	15,506	7.2	6,727	6,521	2,258
1981	228,961	17,634	7.7	7,180	6,132	4,322
1982	207,158	15,603	7.5	3,834	5,774	5,995

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT 446 (Annually); "Highlights of U.S. Export and Import Trade," Report FT 990 (Monthly).

[a] Exports of domestic merchandise including DOD shipments.

[r] Revised.

EXPORTS OF U.S. AEROSPACE PRODUCTS

Calendar Years 1978-1982
(Millions of Dollars)

	1978	1979	1980	1981	1982
TOTAL	$10,001	$11,747	$15,506	$17,634	$15,603
TOTAL CIVIL	$ 6,018	$ 9,772	$13,248	$13,312	$ 9,608
Complete Aircraft—TOTAL	3,625	6,177	8,256	8,613	4,848
Transports	2,558	4,998	6,727	7,180	3,834
General Aviation[a]	496	650	739	790	517
Helicopters	156	207	299	346	206
Other, Including Used	415	322	491	297	291
Aircraft Engines—TOTAL	277	375	556	784	763
Jet & Gas Turbines	231	323	514	739	721
Piston	46	52	42	45	42
Aircraft & Eng. Parts Incl. Spares—TOTAL	2,116	3,220	4,436	3,915	3,997
Aircraft Parts & Accessories	1,472	2,412	3,296	2,960	2,857
Aircraft Engine Parts	644	808	1,140	955	1,140
TOTAL MILITARY	$ 3,983	$ 1,975	$ 2,258	$ 4,322	$ 5,995
Complete Aircraft—TOTAL[b]	2,243	838	949	1,712	2,388
Fighters & Fighter Bombers	1,707	494	449	1,006	1,473
Transports	232	162	231	158	341
Helicopters	82	61	88	177	156
Other, Including Used	222	121	181	371	418
Aircraft Engines—TOTAL	61	67	63	83	140
Jet & Gas Turbines	59	61	58	78	136
Piston	2	6	5	5	4
Aircraft & Eng. Parts Incl. Spares—TOTAL	1,044	467	497	1,971	2,341
Aircraft Parts & Accessories	912	326	369	1,475	1,845
Aircraft Engine Parts	132	141	128	496	496
Guided Missiles, Rockets, & Parts—TOTAL	635	603	749	556	1,126
Guided Missiles & Rockets	335	292	327	213	716
Missile & Rocket Parts	273	279	393	313	378
Missile & Rocket Engines	3	7	13	4	8
Missile & Rocket Engine Parts	24	25	16	26	24

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT 446 (Annually).

[a] All fixed-wing aircraft under 33,000 pounds.

[b] Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.

EXPORTS OF CIVIL AIRCRAFT

Calendar Years 1978-1982

	1978	1979	1980	1981	1982
TOTAL NUMBER OF AIRCRAFT	4,399	5,115	4,434	3,826	1,557
Helicopters, Under 2200 lbs	243	294	335	268	162
Helicopters, Over 2200 lbs	125	165	190	185	92
Single-Engine Aircraft	2,640	2,821	2,172	1,800	539
Multi-Engine Aircraft, Under 4400 lbs	455	645	546	371	167
Multi-Engine Aircraft, 4400-10,000 lbs	339	360	432	426	209
Multi-Engine Aircraft, 10,000-33,000 lbs	37	52	28	20	25
Passenger Aircraft, Over 33,000 lbs	99	172	215	236	110
Cargo Aircraft, Over 33,000 lbs	3	13	8	7	6
Other Aircraft, Over 33,000 lbs	9	15	14	12	5
Other Aircraft, Including Balloons, Gliders & Kites	NA	NA	NA	NA	NA
Used or Rebuilt Aircraft	449	578	494	501	242
TOTAL VALUE (Millions of Dollars)	$3,625	$6,177	$8,256	$8,613	$4,848
Helicopters, Under 2200 lbs	42	61	82	71	45
Helicopters, Over 2200 lbs	114	146	217	275	161
Single-Engine Aircraft	103	124	114	105	36
Multi-Engine Aircraft, Under 4400 lbs	62	94	88	72	35
Multi-Engine Aircraft, 4400-10,000 lbs	240	306	454	526	309
Multi-Engine Aircraft, 10,000-33,000 lbs	91	126	83	87	137
Passenger Aircraft, Over 33,000 lbs	2,111	4,128	5,511	6,087	3,310
Cargo Aircraft, Over 33,000 lbs	142	322	480	363	216
Other Aircraft, Over 33,000 lbs	305	548	736	730	308
Other Aircraft, Including Balloons, Gliders & Kites	27	11	5	62	73
Used or Rebuilt Aircraft	388	311	486	235	218

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).
NA Not available.

EXPORTS OF CIVIL HELICOPTERS

Calendar Years 1978-1982

Region of Destination	1978	1979	1980	1981	1982
TOTAL NUMBER EXPORTED ...	368	459	525	453	254
Canada & Greenland	57	85	91	78	17
Latin America & Caribbean	78	89	143	140	63
Europe	86	103	118	71	49
Middle East	10	11	21	21	13
Asia	99	80	57	70	38
Oceania	31	66	72	32	21
Africa	7	25	23	41	53
TOTAL VALUE (Millions of Dollars)	$155.7	$206.8	$298.7	$346.4	$205.9
Canada & Greenland	17.1	29.4	42.9	40.6	15.2
Latin America & Caribbean	29.7	42.4	78.4	89.5	49.5
Europe	50.5	51.6	79.4	91.8	42.0
Middle East	6.2	11.4	24.9	27.2	12.9
Asia	44.4	45.6	51.3	65.3	50.4
Oceania	5.4	21.1	16.3	19.5	10.6
Africa	2.4	5.3	5.5	12.5	25.3

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

IMPORTS OF CIVIL HELICOPTERS

Calendar Years 1978-1982

Country of Origin	1978	1979	1980	1981	1982
TOTAL NUMBER IMPORTED	74	90	177	213	184
France	66	81	167	193	167
Germany	—	5	9	12	15
Italy	7	4	1	8	1
United Kingdom	—	—	—	—	1
Other Country	1	—	—	—	—
TOTAL VALUE (Millions of Dollars)	$28.0	$21.6	$ 53.9	$105.4	$ 84.9
France	22.8	17.3	48.4	92.4	74.2
Germany	—	1.3	4.4	6.9	8.9
Italy	4.9	3.0	1.1	6.1	1.1
United Kingdom	—	—	—	—	0.7
Other Country	0.3	—	—	—	—

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

EXPORTS OF GENERAL AVIATION AIRCRAFT[a]

Calendar Years 1978-1982

Region of Destination	1978	1979	1980	1981	1982
TOTAL NUMBER EXPORTED	3,471	3,878	3,178	2,617	940
Canada & Greenland	461	478	414	336	94
Latin America & Caribbean	1,195	1,557	1,452	1,220	348
Europe	882	988	760	442	226
Middle East	17	38	19	23	32
Asia	84	120	55	57	40
Oceania	666	537	253	301	113
Africa	166	160	225	238	87
TOTAL VALUE (Millions of Dollars)	$ 495.6	$ 650.5	$ 739.5	$ 789.5	$516.6
Canada & Greenland	41.2	55.7	49.9	57.7	19.3
Latin America & Caribbean	155.0	221.1	239.5	279.6	166.3
Europe	178.2	219.3	235.0	219.7	178.3
Middle East	14.0	27.4	65.1	30.2	18.6
Asia	12.7	31.5	36.9	39.1	25.3
Oceania	53.0	60.7	52.6	75.8	45.1
Africa	41.5	34.8	60.5	87.4	63.7

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

[a] All fixed-wing aircraft under 33,000 pounds.

IMPORTS OF GENERAL AVIATION AIRCRAFT

Calendar Years 1978-1982

Country of Origin	1978	1979	1980	1981	1982
TOTAL NUMBER IMPORTED	190	196	287	352	274
Brazil	—	5	20	37	24
Canada	6	11	38	51	58
France	78	35	48	59	48
Israel	14	26	33	42	22
Japan	62	69	56	70	52
United Kingdom	24	40	62	67	36
Other	6	10	30	26	34
TOTAL VALUE (Millions of Dollars)	$146.8	$260.4	$495.8	$913.0	$837.7
Brazil	—	5.3	21.7	54.0	40.2
Canada	10.7	20.5	88.2	243.0	306.9
France	50.6	75.3	141.8	248.2	222.6
Israel	27.4	55.6	79.2	123.8	72.9
Japan	14.6	19.9	21.7	34.3	37.7
United Kingdom	40.6	74.2	107.1	183.7	143.9
Other	2.9	9.6	36.1	26.0	13.5

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

EXPORTS OF COMMERCIAL TRANSPORT AIRCRAFT

33,000 Pounds and Over Airframe Weight
Calendar Years 1978-1982

	1978	1979	1980	1981	1982
TOTAL NUMBER EXPORTED ...	111	200	237	255	121
Canada	4	20	22	25	13
Latin America & Caribbean	14	19	31	35	13
Europe	36	68	109	108	31
Middle East	17	17	9	21	13
Asia	24	60	53	34	25
Oceania	6	6	7	19	8
Africa	10	10	6	13	18
TOTAL VALUE (Millions of Dollars)	$2,558	$4,998	$6,727	$7,180	$3,834
Canada	132	373	299	584	294
Latin America & Caribbean	187	423	640	1,027	301
Europe	906	1,601	2,670	2,528	938
Middle East	541	582	236	841	699
Asia	478	1,722	2,467	1,405	1,096
Oceania	118	149	179	559	234
Africa	196	148	236	236	272

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

EXPORTS OF MILITARY AIRCRAFT[a]

Calendar Years 1978-1982

	1978	1979	1980	1981	1982
TOTAL NUMBER OF AIRCRAFT	589	332	462	508	637
Fighters & Fighter Bombers	286	133	90	113	154
Transports	25	17	23	22	32
Helicopters	108	65	89	68	55
New Aircraft, NEC	110	91	220	156	228
Used or Rebuilt Aircraft	60	26	40	149	168
Airships, Balloons, Gliders, etc.	NA	NA	NA	NA	NA
TOTAL VALUE (Millions of Dollars)	$2,243	$838	$949	$1,712	$2,388
Fighters & Fighter Bombers	1,707	494	449	1,006	1,473
Transports	232	162	231	158	341
Helicopters	82	61	88	177	156
New Aircraft, NEC	187	96	148	306	361
Used or Rebuilt Aircraft	11	5	2	15	16
Airships, Balloons, Gliders, etc.	24	20	31	50	41

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).
NEC Not elsewhere classified.
NA Not available
a Includes aircraft exported under Military Assistance Programs and Foreign Military Sales.

EXPORTS OF AIRCRAFT ENGINES

Calendar Years 1980-1982
(Millions of Dollars)

	1980		1981		1982	
	Number	Value	Number	Value	Number	Value
TOTAL	4,970	$616	5,014	$867	4,916	$903
Turbine Engines-New	1,012	384	1,259	580	1,491	644
Civil	840	333	1,085	515	1,213	517
Military	172	51	174	65	278	127
Turbine Engines-Used	635	188	722	237	646	213
Civil	553	181	644	224	530	204
Military	82	7	78	13	116	9
Piston Engines	3,323	47	3,033	50	2,779	46
Civil, New, Under 500 HP	1,677	17	1,302	14	1,282	19
Civil, New, Over 500 HP	171	8	171	10	96	6
Civil, Used	1,365	17	1,308	21	1,150	17
Military	110	5	252	5	251	4

Source: Bureau of the Census, "U.S. Exports, Schedule B, Commodity by Country," Report FT446 (Annually).

IMPORTS OF TURBINE AIRCRAFT ENGINES

Calendar Years 1980-1982
(Millions of Dollars)

	1980		1981		1982	
	Number	Value	Number	Value	Number	Value
Turbine Engines	2,645	$748	3,404	$1,049	1,978	$803
Civil	2,549	720	3,326	1,041	1,854	787
Military	96	28	78	8	124	16

Source: Bureau of the Census, "U.S. Imports for Consumption and General Imports, TSUSA Commodity and Country of Origin," Report FT246 (Annually).

EXPORT-IMPORT BANK LENDING AUTHORITY AND GROSS AUTHORIZATIONS SUMMARY

Fiscal Years 1977-1984
(Millions of Dollars)

LOANS[a]

Year	Lending Authority	Authorizations Summary				
			Directs Credits, CFF, and Relending			
		TOTAL Loans[a]	Total Direct Loans[a]	Direct Credits	CFF[b] & Relending	Discount Loans
1977	$2,490	$1,221	$ 747	$ 700	$ 47	$ 474
1978	3,600	3,425	2,927	2,872	55	497
1979	3,750	4,475	3,825	3,725	100	650
1980	4,001	4,578	4,087	4,045	42	491
1981	5,461[c]	5,431	5,079	5,045	34	352
1982	4,400[c]	3,516	3,104	3,104	(*b*)	412
1983[E]	4,400[c]	NA	NA	NA	NA	NA
1984[E]	3,830[c]	NA	NA	NA	NA	NA

GUARANTEES AND INSURANCE

Year	Lending Authority	Authorizations Summary		
		TOTAL Guarantees and Insurance	Guarantees	Insurance
1977	$ (*d*)	$4,379	$1,021	$3,358
1978	(*d*)	3,951	589	3,362
1979	(*d*)	5,016	908	4,108
1980	(*d*)	8,032	2,510	5,522
1981	8,059	7,423	1,513	5,910
1982	9,220	5,832	727	5,105
1983[E]	9,000	NA	NA	NA
1984[E]	10,000	NA	NA	NA

Source: Export-Import Bank of the United States.

NOTE: Detail may not add to totals because of rounding.

[a] Discount Loans excluded from loan lending authority limitation until FY 1981. Comparable authorization data for 1980 and prior years are therefore listed under Total Direct Loans, which include Direct Credits, CFF and Relending Loans. For 1981 and subsequent years, compare TOTAL Loans authorization data with lending authority, both of which include Discount Loans. The value of Total Direct Loans may exceed Lending Authority because of the inclusion in Total Direct Loans of the full amount of Certificates of Loan Participation (COLPs), portions of which are subsequently sold to commercial banks.

[b] CFF (Cooperative Financing Facility) program discontinued after 1981.

[c] Effective 1981, lending authority includes discount loans as well as direct loans. 1981 total includes $5,061 million regular loans and $400 million discount loans; 1982 total includes $4,000 million regular loans and $400 million discount loans; 1983 total includes $4,000 million regular loans and $400 million discount loans; 1984 total includes $3,730 million regular loans and $100 million discount loans plus supplemental direct credit authority of up to an additional $2,670 million if needed to meet subsidized foreign officially-supported competition.

[d] Limitation for Guarantees and Insurance began in 1981.

[E] Estimate.

NA Not available.

EXPORT-IMPORT BANK
TOTAL AUTHORIZATIONS OF LOANS AND GUARANTEES AND AUTHORIZATIONS IN SUPPORT OF AIRCRAFT EXPORTS

Fiscal Years 1974-1982
(Millions of Dollars)

Year	TOTAL AUTHORIZATIONS	Authorizations in Support of Aircraft Exports[a]			
		TOTAL	Percent of TOTAL Authorizations	Commercial Jet Aircraft	Other Aircraft[b]
LOANS[c]					
1974	$3,981[r]	$ 946.2	23.8[r]%	$ 894.6	$51.6
1975	2,701[r]	710.4[r]	26.3[r]	691.2	19.2[r]
1976	2,285	421.9	18.5[r]	398.4	23.5
Tr. Qtr.	282	98.3	34.9[r]	93.8	4.5
1977	747	139.0	18.6	137.6	1.4
1978	2,927	195.2	6.7	189.5	5.7
1979	3,825	1,427.7[r]	37.3[r]	1,399.4	28.3[r]
1980	4,087	1,710.1	41.8	1,692.6	17.5
1981	5,079	2,555.0[r]	50.3	2,550.3	4.7[r]
1982	3,104	241.4	7.8	199.1	42.3
GUARANTEES[d]					
1974	$1,594	$ 154.0[r]	9.7[r]%	$ 132.9[r]	$21.1[r]
1975	1,574	84.5[r]	5.4[r]	64.0	20.5[r]
1976	1,661	107.6[r]	6.5[r]	87.2	20.4[r]
Tr. Qtr.	272	62.6	23.0[r]	58.7	3.9
1977	1,021	307.5[r]	30.1[r]	293.9[r]	13.6[r]
1978	589	97.6	16.6	77.2	20.4
1979	908	261.4[r]	28.8	239.3	22.1[r]
1980	2,510	1,131.9	45.1	1,088.1	43.8
1981	1,513[r]	562.6[r]	37.2[r]	533.4	29.2[r]
1982	727	104.2	14.3	78.4	25.8

Source: Export-Import Bank of the United States.

[a] Includes complete aircraft, engines, and parts.

[b] Includes business aircraft, general aviation aircraft, helicopters, and related goods and services.

[c] Loans are commitments for direct financing by the Export-Import Bank to foreign buyers of U.S. equipment and services, including Direct Credits and loans authorized under the Cooperative Financing Facility (CFF), until the termination of the CFF program in 1981, but excluding Discount Loans, which are made by the Export-Import Bank to commercial banks and which subsequently may be guaranteed by the Export-Import Bank, in which case the value of the loans is included with Guarantees.

[d] Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions.

[r] Revised from data previously reported by AIA.

EXPORT-IMPORT BANK
SUMMARY OF COMMERCIAL JET AIRCRAFT AUTHORIZATIONS FOR LOANS[a] AND GUARANTEES[b]

Fiscal Years 1957-1982
(Values in Millions of Dollars)

Year	No. of Jets		Export Value		No. of Credits		Gross Authorizations	
	Loans	Guar-antees	Loans	Guar-antees	Loans	Guar-antees	Loans	Guar-antees
New Authorizations:								
1957[c]-1968	322	53	$ 2,572	$ 331	92	58	$ 1,520	$ 274
1969	55	23	451	207	23	18	197	111
1970	142	1	1,749	3	44	38	598	79
1971	126	9	1,539	40	58	49	481[r]	363[r]
1972	145	2	1,334	9	44	29	475	183[r]
1973	129	4	1,729	25	60	23	690	191[r]
1974	189	—	2,195	—	79	22	895	133
1975	136	1	2,070	5	64	10	691	64
1976	77	6	1,017	139	34	11	398	87
Tr. Qtr.	15	5	219	182	6	3	94	59
1977	31	25	330	902	16	14	138	294
1978	29	5	479	253	18	5	189	77
1979	118	7	2,938	317	35	10	1,399	239
1980	136	21	3,975	901	36	24	1,693	1,088
1981	121	18	4,568	637	26	17	2,550	533
1982	13	7	441	113	5	2	199	78
Cumulative New Authorizations	1,784	187	27,603	4,064	640	333	12,208	3,853
Transfers & Reversals	—	—	(8)	—	4	—	(24)	(20)
Cumulative Gross Authorizations (net of Transfers & Reversals)	1,784	187	27,595	4,064	644	333	12,184	3,833

Source: Export-Import Bank of the United States.

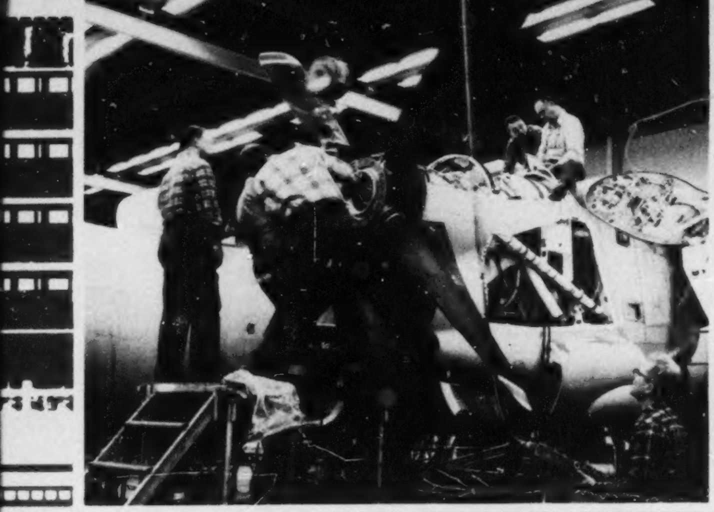
NOTE: Detail may not add to totals because of rounding.

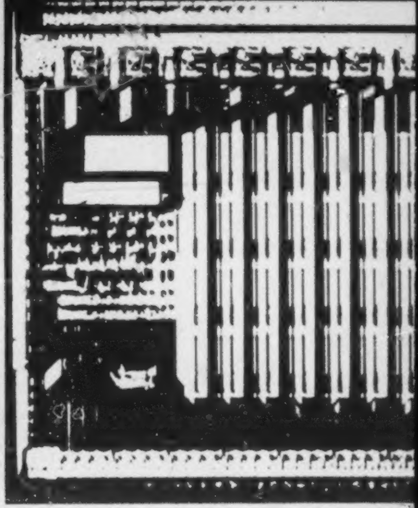
[a] Loans are commitments for direct financing by the Export-Import Bank to foreign buyers of U.S. equipment and services, including Direct Credits and loans authorized under the Cooperative Financing Facility (CFF) until the termination of the CFF program in 1981, but excluding Discount Loans, which are made by the Export-Import Bank to commercial banks and which subsequently may be quaranteed by the Export-Import Bank, in which case the value of the loans is included with Guarantees.

[b] Guarantees by the Export-Import Bank provide assurances of repayment of principal and interest on loans made by private lending institutions, such as commercial banks, for major export transactions.

[c] First year of commercial jet aircraft authorizations.

[r] Revised from data previously reported by AIA.





EMPLOYMENT

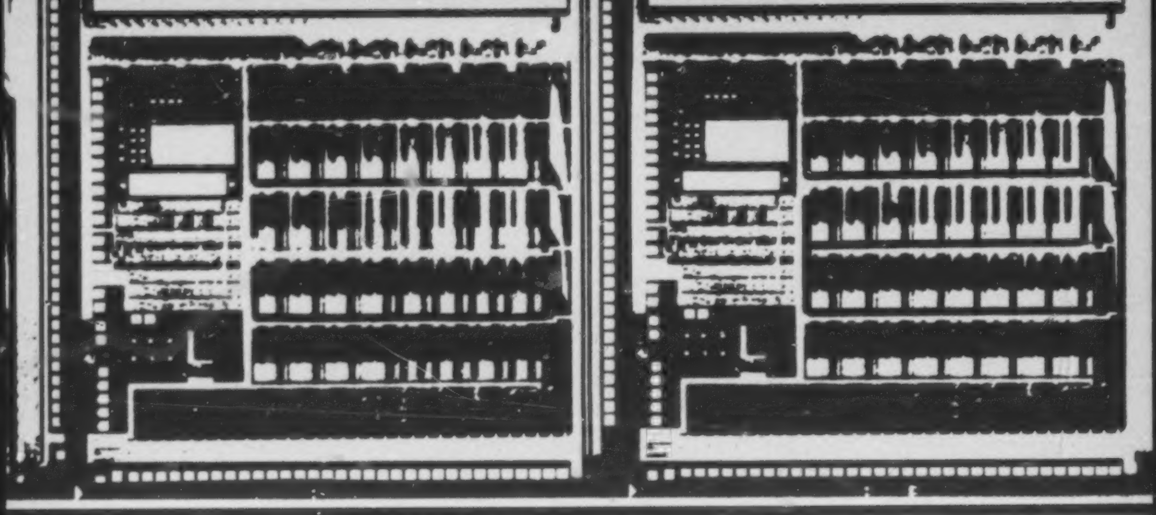
Aerospace industry average employment for 1982 was 1,162,000, down 3.4 percent from the previous year's level of 1,203,000. The drop was due to reduced activity in the civil aircraft production segment of the industry, particularly a lull in production of commercial transports due to the continuing financial difficulties of the world's airlines.

Employment among companies manufacturing aircraft, engines and parts dipped by 37,000, while employment in fabrication of missiles and space vehicles increased by 5,000 and the work force engaged in production of communications and navigation equipment grew by 1,000. There was a large drop—10,000—in the other products and services category.

Total employment in the aircraft, engines and parts segment was 612,000 in 1982, down from 649,000 in 1981. Despite the personnel drop, aircraft manufacture continued to account for more than half (53 percent) of the total industry labor force. Employment in the missiles/space segment averaged 127,000, or just under 11 percent; production of communications/navigation equipment involved 154,000 workers, more than 13 percent. The rest of the work force—269,000, or more than 23 percent—was in the other products and services category.

The number of production workers in the aerospace industry declined 7.4 percent, from 591,000 in 1981 to 547,000 in 1982. Here the drop was across the board, except for a slight increase in missile/space employment, some 2,000 workers. The number engaged in aircraft, engine and parts production fell from 345,000 in 1981 to 310,000 in 1982; communications/navigation workers dropped from 73,000 to 71,000; and workers in the "other" category declined from 136,000 to 127,000.

Despite the reduction in the labor force, the industry's total payroll for 1982 reached an all-time high $33.8 billion. Industry-wide, average hourly earn-



ings were $11.22, which compares with $10.29 in the previous year. The average weekly pay check was $461, up from $424. Weekly earnings varied among the different segments of the aerospace industry; examples: airframe manufacture, $485; engines and parts, $454; missiles/space, $447; other aircraft employment, $431. Employees took home, on the average, about $4.50 a week more, after inflation adjustment, than they did in the previous year. The average weekly hours worked by an aerospace employee amounted to 41.1 and overtime average 3.2 hours a week.

An Aerospace Industries Association survey mid-way through 1982 indicates that the industry labor force will increase to 1,185,000 by the end of 1983. The gain of 23,000 includes a boost of some 10,000 production workers; an increase of about 5,000 scientists and engineers, reflecting greater research and development activity; 3,000 more technicians; and 5,000 additional employees in the "all others" category.

The survey projected an increase of about 7,000 workers in aircraft manufacture, despite loss of an additional 5,700 employees in the still-depressed commercial transport production segment; increasing momentum in military aircraft production programs is expected to outweigh the drop in the civil aircraft work force. Employment in the missiles/space area is expected to increase by about 5,000 in 1983.

Helicopter production employment is projected to rebound. The rotary wing aircraft segment of the industry suffered sharply reduced sales dollar volume and unit deliveries in 1983 and as a consequence the personnel force dropped to its lowest level since 1977. For 1983, however, the AIA survey predicts that employment will climb, by the end of the year, to 29,200, a level close to the all-time peak. The estimate is based on increased civil helicopter sales as the economy recovers and increased military helicopter production under the defense expansion program.

ANNUAL AVERAGE EMPLOYMENT IN ALL MANUFACTURING, DURABLE GOODS AND AEROSPACE INDUSTRIES

Calendar Years 1961-1982
(Thousands of Employees)

Year	All Manufacturing Industries	Durable Goods Industries	Aerospace Industry		
			TOTAL	As Percent of All Manufacturing	As Percent of Durable Goods
1961	16,326	9,070	1,178	7.2%	13.0%
1962	16,853	9,480	1,270	7.5	13.4
1963	16,995	9,616	1,267	7.5	13.2
1964	17,274	9,816	1,209	7.0	12.3
1965	18,062	10,405	1,175	6.5	11.3
1966	19,214	11,282	1,375	7.2	12.2
1967	19,447	11,439	1,484	7.6	13.0
1968	19,781	11,626	1,502	7.6	12.9
1969	20,167	11,895	1,402	7.0	11.8
1970	19,367	11,208	1,166	6.0	10.4
1971	18,623	10,636	951	5.1	8.9[r]
1972	19,151	11,049	912	4.8	8.3
1973	20,154	11,891	956	4.7	8.0
1974	20,077	11,925	982	4.9	8.2
1975	18,323	10,688	941	5.1	8.8
1976	18,997	11,077	896	4.7	8.1
1977	19,682	11,597	893	4.5	7.7
1978	20,505	12,274	977	4.8	8.0
1979	21,040	12,760	1,109	5.3	8.7
1980	20,285[r]	12,187[r]	1,185[r]	5.8	9.7
1981	20,173[r]	12,117[r]	1,203[r]	6.0	9.9
1982	18,848	11,112	1,162	6.2	10.5

Source: Manufacturing and Durable Goods Employment from Bureau of Labor Statistics, "Employment and Earnings" (Monthly); Aerospace Employment from Aerospace Industries Association estimates based on "Employment and Earnings," Bureau of Labor Statistics.

NOTE: For explanation of "Aerospace Employment," see the Glossary.

r Revised.

ANNUAL PAYROLL
AEROSPACE INDUSTRY AND ALL MANUFACTURING INDUSTRIES

Calendar Years 1961-1982
(Millions of Dollars)

Year	All Manufacturing Industries	Aerospace[a]			Aerospace As Percent of All Manufacturing
		TOTAL	Production Workers	Other	
1961	$ 89,800	$ 9,140	$ 4,342	$ 4,798	10.2%
1962	96,700	10,232	4,871	5,361	10.6
1963	100,600	10,173	4,588	5,585	10.1
1964	107,100	10,067	4,563	5,504	9.4
1965	115,500	10,188	4,504	5,684	8.8
1966	128,000	12,139	5,641	6,498	9.5
1967	134,100	13,727	6,382	7,345	10.2
1968	145,800	14,397	6,582	7,815	9.9
1969	157,500	14,649	6,401	8,248	9.3
1970	158,200	12,275	5,322	6,953	7.8
1971	160,300	10,480	4,409	6,071	6.5
1972	175,400	10,504	4,280	6,224	6.0
1973	196,200	12,107	5,087	7,020	6.2
1974	211,400	13,535	5,672	7,863	6.4
1975	211,000	14,608	5,935	8,673	6.9
1976	237,400	14,881	5,951	8,930	6.3
1977	266,000	16,276	6,464	9,812	6.1
1978	299,200	19,501	7,873	11,628	6.5
1979	333,900[r]	24,243	10,247	13,996	7.3
1980	354,400[r]	28,738[r]	12,087	16,651[r]	8.1
1981	386,400[r]	31,990[r]	13,040[r]	18,950[r]	8.3
1982	382,600	33,778	13,103	20,675	8.8

Source: Manufacturing Payroll from Bureau of Economic Analysis, "Survey of Current Business;" Aerospace Payroll from Aerospace Industries Association estimates.

[a] Based on AIA estimates of annual average employment and earnings for the aerospace industry; derived from BLS data (see Glossary, "Aerospace Employment" and "Aerospace Payroll").

[r] Revised.

EMPLOYMENT IN THE AEROSPACE INDUSTRY[a]

Calendar Years 1968-1982
(Annual Average, Thousands of Employees)

Year	TOTAL	Aircraft, Engines, & Parts	Missiles & Space Vehicles	Communi-cations & Navigation Equipment	Other
TOTAL EMPLOYMENT					
1968	1,502	852	150	184	316
1969	1,402	804	124	179	295
1970	1,166	669	98	152	247
1971	951	531	88	129	203
1972	912	495	93	113	211
1973	956	525	93	116	222
1974	982	539	94	121	228
1975	941	514	93	116	218
1976	896	487	86	115	208
1977	893	482	83	121	207
1978	977	527	93	129	228
1979	1,109	611	102	139	257
1980[r]	1,185	652	111	147	275
1981[r]	1,203	649	122	153	279
1982	1,162	612	127	154	269
PRODUCTION WORKERS					
1968	807	506	52	80	169
1969	746	464	41	86	155
1970	604	369	31	77	127
1971	480	285	26	66	103
1972	455	266	28	55	106
1973	482	284	29	57	112
1974	494	292	29	59	114
1975	461	271	29	54	107
1976	433	251	28	54	100
1977	429	247	26	56	100
1978	476	275	29	61	111
1979	562	332	33	67	130
1980[r]	598	355	35	70	137
1981[r]	591	345	37	73	136
1982	547	310	39	71	127

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] See Glossary for detailed explanation of "Aerospace Employment."

[r] Revised.

EMPLOYMENT IN THE AIRCRAFT, ENGINES, AND PARTS INDUSTRY[a]

Calendar Years 1968-1982
(Annual Average, Thousands of Employees)

Year	TOTAL	Airframes	Engines and Parts	Other Parts and Equipment
TOTAL EMPLOYMENT				
1968	852.0	468.2	216.4	147.8
1969	804.4	456.7	205.0	142.7
1970	668.7	369.6	179.9	119.2
1971	530.8	287.7	150.6	92.6
1972	494.9	287.2	124.0	83.6
1973	524.9	300.5	132.6	91.8
1974	539.4	307.6	134.6	97.1
1975	514.0	292.8	126.3	94.9
1976	487.1	281.1	119.7	86.3
1977	481.7	270.4	120.9	90.4
1978	527.2	288.3	133.5	105.5
1979	610.8	333.2	151.6	126.1
1980[r]	652.3	349.3	162.9	140.1
1981[r]	648.9	345.8	163.3	139.8
1982	611.8	325.0	151.4	135.5
PRODUCTION WORKERS				
1968	505.5	280.9	123.9	100.7
1969	464.0	255.1	114.1	94.8
1970	369.3	197.0	95.0	77.3
1971	284.5	147.1	79.0	58.4
1972	266.2	145.1	68.6	52.5
1973	284.2	151.5	74.2	58.5
1974	291.9	154.4	75.2	62.3
1975	271.1	140.9	70.5	59.7
1976	250.7	132.2	65.6	53.0
1977	246.8	124.4	66.6	55.8
1978	275.4	133.9	75.3	66.2
1979	332.1	165.9	86.4	79.8
1980[r]	354.6	173.7	93.0	88.0
1981[r]	344.6	167.8	92.9	83.9
1982	309.9	146.9	85.7	77.3

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly).

[a] See Glossary for detailed explanation of "Aerospace Employment."

AVERAGE EARNINGS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1972-1982

Year	TOTAL[a]	Aircraft				Guided Missiles, Space Vehicles & Parts
		TOTAL	Airframes	Engines and Parts	Other Parts and Equipment	
AVERAGE HOURLY EARNINGS[b]						
1972	$ 4.63	$ 4.62	$ 4.65	$ 4.72	$ 4.42	$ 4.75
1973	4.99	4.99	5.09	5.04	4.70	5.02
1974	5.43	5.42	5.58	5.41	5.05	5.48
1975	6.00	6.00	6.21	6.04	5.47	6.02
1976	6.44	6.44	6.63	6.46	5.95	6.48
1977	6.93	6.92	7.07	7.05	6.44	7.04
1978	7.54	7.54	7.70	7.80	6.93	7.56
1979	8.26	8.26	8.50	8.53	7.48	8.25
1980	9.27	9.28	9.66	9.42	8.40	9.22
1981	10.29	10.31	10.74	10.41	9.38	10.06
1982	11.22	11.25	11.85	11.16	10.26	10.96
AVERAGE WEEKLY EARNINGS[b]						
1972	$186.62	$185.26	$180.89	$193.52	$186.52	$199.50
1973	202.95	202.10	199.53	209.66	199.75	211.34
1974	221.10	220.59	222.08	221.81	213.62	226.32
1975	247.53	247.80	255.85	247.04	228.65	245.01
1976	263.31	263.40	273.16	259.69	245.74	262.44
1977	289.76	289.95	296.23	291.87	273.70	287.94
1978	318.05	318.19	324.17	325.26	298.68	316.76
1979	350.64	351.05	359.55	360.82	322.39	346.50
1980	388.71	389.76	403.79	393.76	357.84	378.02
1981	424.33	425.80	443.56	421.61	397.71	410.45
1982	460.68	462.38	484.67	454.21	430.92	447.17

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] TOTAL column is a weighted average based on BLS employment data.

[b] Includes overtime premiums.

AVERAGE EARNINGS IN THE AEROSPACE INDUSTRY IN CONSTANT DOLLARS[a]

Production Workers Only
Calendar Years 1972-1982

Year	TOTAL[b]	Aircraft				Guided Missiles, Space Vehicles & Parts
		TOTAL	Airframes	Engines and Parts	Other Parts and Equipment	
AVERAGE HOURLY EARNINGS[c] IN CONSTANT DOLLARS (1972 = 100)[a]						
1972	$ 4.63	$ 4.62	$ 4.65	$ 4.72	$ 4.42	$ 4.75
1973	4.70	4.70	4.79	4.75	4.43	4.73
1974	4.61	4.60	4.73	4.59	4.28	4.65
1975	4.66	4.66	4.83	4.69	4.25	4.68
1976	4.73	4.73	4.87	4.75	4.37	4.76
1977	4.78	4.78	4.88	4.87	4.44	4.86
1978	4.84	4.84	4.94	5.00	4.45	4.85
1979	4.76	4.76	4.90	4.92	4.31	4.76
1980	4.71	4.71	4.90	4.78	4.26	4.68
1981	4.73	4.74	4.94	4.79	4.31	4.63
1982	4.86	4.88	5.14	4.84	4.45	4.75
AVERAGE WEEKLY EARNINGS[c] IN CONSTANT DOLLARS (1972 = 100)[a]						
1972	$186.62	$185.26	$180.89	$193.52	$186.52	$199.50
1973	191.10	190.30	187.88	197.42	188.09	199.00
1974	187.53	187.10	188.36	188.13	181.19	191.96
1975	192.33	192.54	198.80	191.95	177.66	190.37
1976	193.47	193.53	200.71	190.81	180.56	192.83
1977	199.97	200.10	204.44	201.43	188.89	198.72
1978	204.01	204.10	207.93	208.63	191.58	203.18
1979	202.10	202.33	207.23	207.97	185.82	199.71
1980	197.31	197.85	204.97	199.88	181.64	191.89
1981	195.18	195.86	204.03	193.93	182.94	188.80
1982	199.69	200.42	210.09	196.88	186.79	193.83

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] Based on Consumer Price Index (CPI), published by the Bureau of Labor Statistics with 1967 base year, converted to 1972 base year by AIA.

[b] TOTAL column is a weighted average based on BLS employment data.

[c] Includes overtime premiums.

AVERAGE HOURS IN THE AEROSPACE INDUSTRY

Production Workers Only
Calendar Years 1972-1982

AVERAGE WEEKLY HOURS

Year	TOTAL[a]	Aircraft				Guided Missiles, Space Vehicles, & Parts
		TOTAL	Airframes	Engines and Parts	Other Parts and Equipment	
1972	40.2	40.0	38.9	40.9	42.2	41.9
1973	40.6	40.5	39.2	41.6	42.5	42.1
1974	40.8	40.7	39.8	41.0	42.3	41.3
1975	41.2	41.3	41.2	40.9	41.8	40.7
1976	40.9	40.9	41.2	40.2	41.3	40.5
1977	41.8	41.9	41.9	41.4	42.5	40.9
1978	42.2	42.2	42.1	41.7	43.1	41.9
1979	42.5	42.5	42.3	42.3	43.1	42.0
1980	41.9	42.0	41.8	41.8	42.6	41.0
1981	41.3	41.3	41.3	40.5	42.4	40.8
1982	41.1	41.1	40.9	40.7	42.0	40.8

AVERAGE WEEKLY OVERTIME HOURS

Year	TOTAL[a]	Aircraft, Engines, and Parts	Guided Missiles, Space Vehicles, and Parts
1972	3.0	3.0	2.6
1973	3.2	3.3	2.7
1974	3.3	3.3	3.0
1975	3.0	3.0	3.3
1976	2.7	2.7	2.7
1977	3.5	3.5	3.2
1978	4.4	4.4	4.1
1979	4.7	4.7	4.4
1980	4.1	4.2	3.6
1981	3.5	3.5	3.2
1982	3.2	3.2	3.1

Source: Aerospace Industries Association, derived from "Employment and Earnings" (Monthly), Bureau of Labor Statistics.

[a] TOTAL column is a weighted average based on BLS employment data.

LABOR TURNOVER RATES IN THE AEROSPACE INDUSTRY

Calendar Years 1967-1981[a]
(Rates per 100 Employees per Year)

Year	Missiles and Space Vehicles	Aircraft			
		TOTAL	Airframes	Engines & Parts	Other Parts & Equipment
ACCESSIONS					
1967	43.5	37.4	36.6	32.5	46.6
1968	40.7	28.1	27.1	22.9	39.8
1969	27.4	23.4	20.8	24.6	31.5
1970	19.3	16.1	13.9	15.1	26.2
1971	21.6	20.4	21.6	13.2	27.6
1972	20.4	24.0	21.6	21.6	37.2
1973	20.4	26.4	22.8	24.0	43.2
1974	22.8	25.2	24.0	18.0	39.6
1975	15.6	16.8	18.0	10.8	20.4
1976	14.4	18.0	16.8	13.2	25.2
1977	19.2	25.2	22.8	20.4	36.0
1978	21.6	31.2	30.0	24.0	42.0
1979	28.8	32.4	28.8	25.2	50.4
1980	26.4	22.8	20.4	18.0	36.0
1981[a]	21.6	16.8	14.4	13.2	27.6
SEPARATIONS					
1967	34.0	32.2	27.9	34.1	43.9
1968	45.4	32.3	30.2	31.3	41.1
1969	46.6	33.2	30.8	32.3	42.4
1970	48.7	41.7	43.8	32.1	47.4
1971	37.2	36.0	32.4	34.8	50.4
1972	19.2	24.0	21.6	18.0	39.6
1973	24.0	25.2	22.8	21.6	37.2
1974	22.8	22.8	20.4	19.2	34.8
1975	18.0	26.4	26.4	22.8	32.4
1976	18.0	21.6	20.4	15.6	31.2
1977	18.0	21.6	21.6	15.6	27.6
1978	18.0	18.0	15.6	14.4	30.0
1979	18.0	20.4	16.8	15.6	34.8
1980	15.6	19.2	15.6	15.6	32.4
1981[a]	14.4	21.6	18.0	20.4	30.0

Source: Bureau of Labor Statistics, "Employment and Earnings" (Monthly).

[a] Data series terminated by BLS at end of 1981.

OCCUPATIONAL INJURY AND ILLNESS INCIDENCE RATES[a] ALL MANUFACTURING AND AEROSPACE INDUSTRIES

Calendar Years 1977-1981

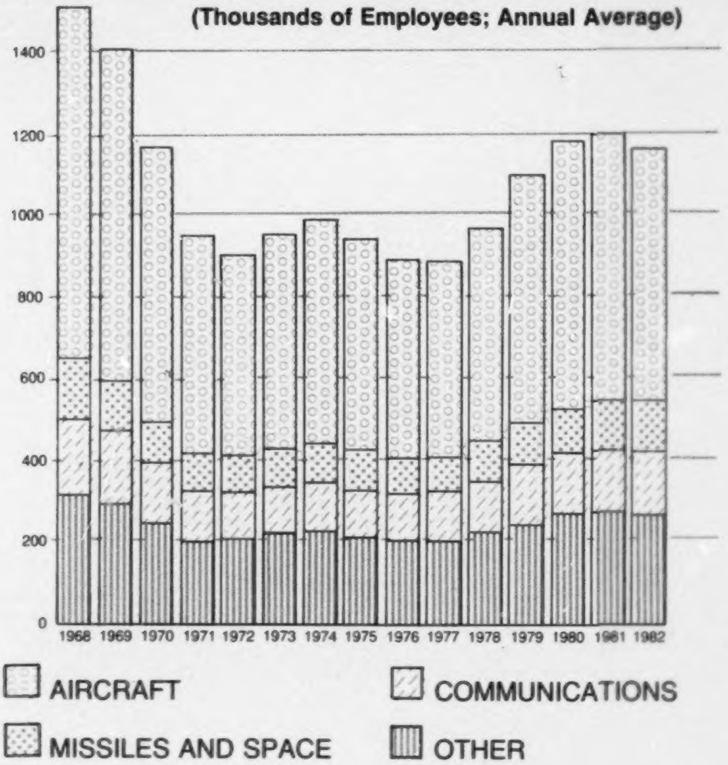
	1977	1978	1979	1980	1981
All Manufacturing:					
Total Cases	13.1	13.2	13.3	12.2	11.5
Lost Workday Cases	5.1	5.6	5.9	5.4	5.1
Nonfatal Cases without Lost Workdays	8.0	7.6	7.4	6.8	6.4
Lost Workdays	82.3	84.9	90.2	86.7	82.0
Aircraft and Parts (SIC 372):					
Total Cases	6.0	6.5	7.1	6.8	6.2
Lost Workday Cases	2.2	2.5	3.0	2.9	2.6
Nonfatal Cases without Lost Workdays	3.8	4.0	4.1	3.8	3.6
Lost Workdays	35.5	37.7	49.1	46.9	41.7
Aircraft (SIC 3721):					
Total Cases	4.6	4.8	5.2	4.8	4.8
Lost Workday Cases	1.6	1.9	2.4	2.0	1.8
Nonfatal Cases without Lost Workdays	2.9	2.9	2.8	2.8	2.9
Lost Workdays	29.0	31.6	44.0	35.1	29.7
Aircraft Engines and Parts (SIC 3724):					
Total Cases	6.1	7.1	8.0	7.8	6.6
Lost Workday Cases	2.5	3.0	3.5	4.0	3.6
Nonfatal Cases without Lost Workdays	3.6	4.1	4.5	3.7	3.0
Lost Workdays	39.8	43.1	55.0	68.3	64.7
Aircraft Parts (SIC 3728):					
Total Cases	10.1	11.2	10.9	10.6	9.4
Lost Workday Cases	3.4	3.7	4.0	3.9	3.4
Nonfatal Cases without Lost Workdays	6.7	7.5	6.9	6.7	6.0
Lost Workdays	49.7	49.6	55.8	53.4	45.1
Guided Missiles, Space Vehicles & Parts SIC 376):					
Total Cases	3.0	4.2	3.1	3.1	2.6
Lost Workday Cases	1.1	1.5	1.4	1.4	1.2
Nonfatal Cases without Lost Workdays	1.8	2.7	1.7	1.7	1.4
Lost Workdays	20.4	23.0	20.8	21.9	19.2
Guided Missiles & Space Vehicles (SIC 3761):					
Total Cases	2.7	3.6	2.7	2.9	2.1
Lost Workday Cases	1.1	1.4	1.3	1.3	1.0
Nonfatal Cases without Lost Workdays	1.6	2.2	1.4	1.6	1.0
Lost Workdays	19.6	20.3	19.9	20.9	17.3
Space Propulsion Units & Parts (SIC 3764):					
Total Cases	4.9	7.2	4.2	3.5	4.1
Lost Workday Cases	1.5	2.5	1.8	1.8	1.9
Nonfatal Cases without Lost Workdays	3.4	4.7	2.4	1.7	2.2
Lost Workdays	27.3	38.0	25.5	23.8	25.7
Other Space Vehicle Equipment (SIC 3769):					
Total Cases	—	4.8	5.1	4.2	4.6
Lost Workday Cases	—	1.7	1.4	2.1	1.7
Nonfatal Cases without Lost Workdays	—	3.1	3.7	2.1	2.9
Lost Workdays	—	23.6	20.9	28.2	23.0

Source: Department of Labor, Bureau of Labor Statistics, "Occupational Injuries and Illnesses" (Annually).

[a] Defined as the number of injuries and illnesses per 100 full-time workers. Separate incidence rates also available for occupational injuries only.

AEROSPACE EMPLOYMENT BY PRODUCT GROUP

(Thousands of Employees; Annual Average)



Source: Aerospace Industries Association

AEROSPACE INDUSTRY WORK STOPPAGES[a]

Calendar Years 1967-1982[b]

Year	Number of Strikes	Number of Workers Involved	Man-Days Idle in Year	Year	Number of Strikes	Number of Workers Involved	Man-Days Idle in Year
1967	22	28,800	160,800	1975	20	22,800	1,245,600
1968	46	45,500	594,300	1976	21	13,000	330,500
1969	26	76,400	1,564,600	1977	21	46,700	1,832,200
1970	12	6,800	552,500	1978	17	13,700	741,200
1971	24	17,200	465,500	1979	12	6,600	103,400
1972	18	2,800	148,100	1980	17	4,400	92,900
1973	13	4,500	99,100	1981	12	6,100	188,900
1974	27	16,800	370,000	1982[b]	4	11,900	45,200

Source: Department of Labor, Bureau of Labor Statistics, Division of Wages and Industry Relations.

[a] Based on SIC 372 of the 1967 Code, which includes space vehicle equipment not elsewhere classified but excludes guided missiles and space vehicles, and space propulsion units and parts.

[b] Effective 1982, data not available for work stoppages involving fewer than 1,000 employees.

EMPLOYMENT AND COST OF R&D SCIENTISTS AND ENGINEERS ALL INDUSTRIES AND AEROSPACE INDUSTRY

1972-1982

Year	Employment[a]			Cost per R&D Scientist and Engineer[d]	
	All Industries[b] (Thousands)	Aerospace[c] (Thousands)	Aerospace as a Percent of All Industries	All Industries[b]	Aerospace[c]
1972	350.2	70.8	20.2%	$ 55,300	$ 69,200
1973	357.7	72.1	20.2	59,200	70,800
1974	360.0	70.6	19.6	63,300	76,400
1975	363.3	67.5	18.6	66,500	85,100
1976	364.4	66.9	18.4	72,200	91,300
1977[p]	382.8	72.0	18.8	75,800	91,300
1978[p]	404.4	82.0	20.3	80,400	89,400
1979[p]	423.9	86.5	20.4	86,500	93,300
1980[p]	460.0	85.9	18.7	93,900	101,600
1981[p]	487.8	95.2	19.5	103,700	122,900
1982	511.6	95.3	18.6	NA	NA

Source: National Science Foundation.

[a] Employment as of January. Scientists and engineers working less than full time have been included in terms of their full time equivalent number.

[b] All manufacturing industries and those non-manufacturing industries known to conduct or finance research and development.

[c] SIC codes 372 and 376.

[d] The arithmetic mean of the numbers of R&D scientists and engineers reported for January in two consecutive years, divided into the total R&D expenditures of each industry during the earlier year.

[p] Preliminary data for major revision resulting from selection of new survey sample.

NA Not available.

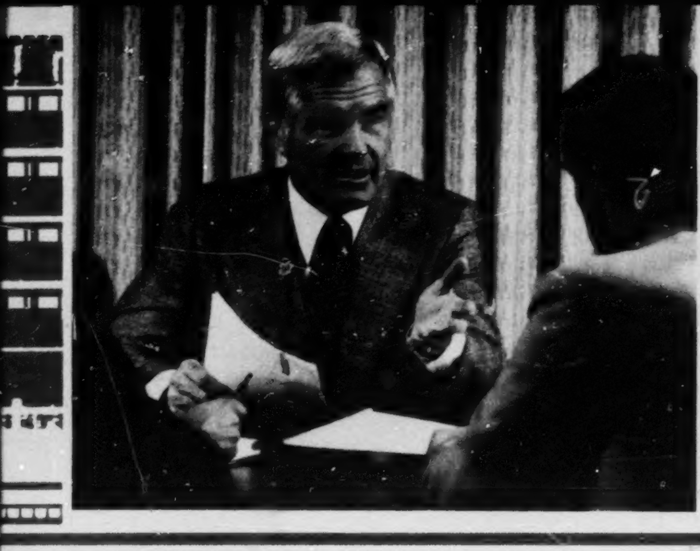
EMPLOYMENT IN NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PROGRAMS

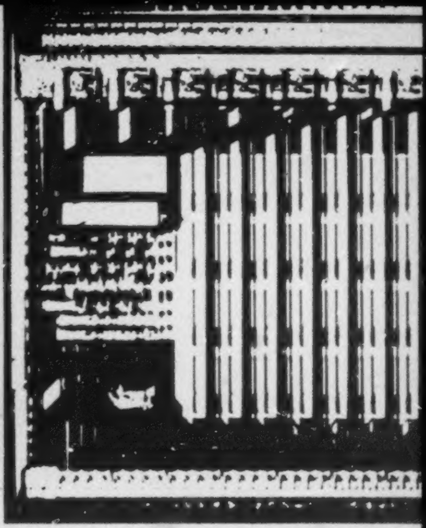
End of Fiscal Years 1960-1984

Year	TOTAL	NASA Employees	Contractor Employees[E]
1960	46,768	10,268	36,500
1961	74,577	17,077	57,500
1962	137,656	22,156	115,500
1963	246,304	27,904	218,400
1964	379,084	31,984	347,100
1965	409,900	33,200	376,700
1966	393,924	33,924	360,000
1967	306,926	33,726	273,200
1968	267,871	32,471	235,400
1969	218,345	31,745	186,600
1970	160,850	31,350	129,500
1971	143,578	29,478	114,100
1972	138,800	27,500	111,300
1973	134,850	26,850	108,000
1974	125,220	25,020	100,200
1975	127,733	24,333	103,400
1976	130,739	24,039	108,000
1977	124,136	23,636	100,500
1978	124,637	23,237	101,400
1979	131,931	22,831	109,100
1980	135,613	22,613	113,000
1981	133,473	21,873	111,600
1982	127,952	21,652	106,300
1983[E]	136,219	21,219	115,000
1984[E]	134,219	21,219	113,000

Source: NASA Briefing on the Budget of the United States (Annually), and NASA Headquarters.

[E] Estimate.





FINANCE

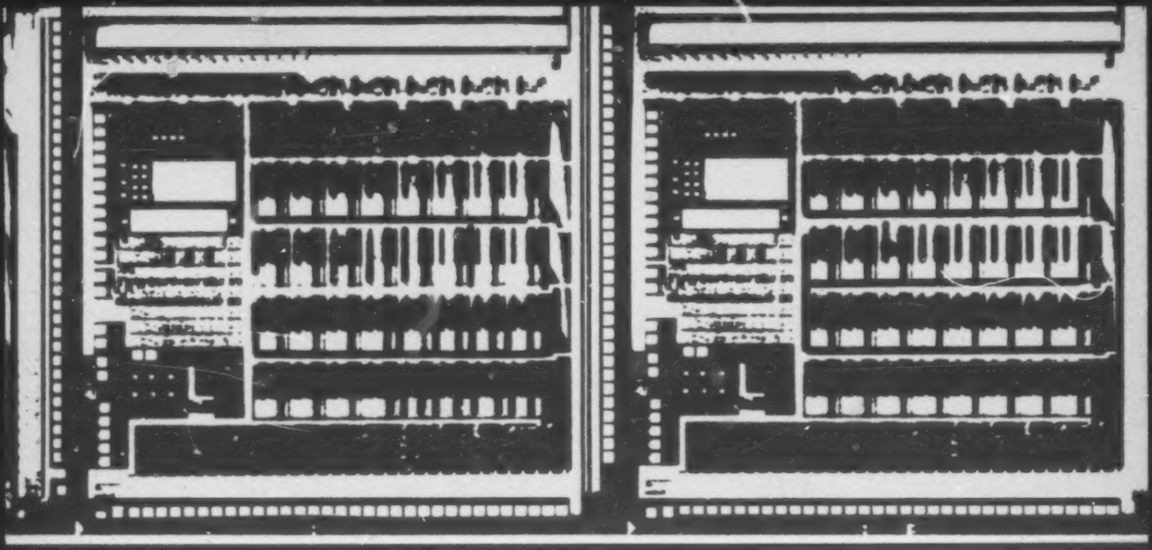
Although aerospace industry sales went up in 1982, profits went down. The industry's net profit after taxes was $2.2 billion, which compares with the all-time high of almost $3 billion recorded in 1981.

Expressed as a percentage of sales, the profit rate was 3.2 percent, compared with 4.4 percent in the previous year. The aerospace decline was consistent with the experience of all U.S. manufacturing industries, whose profit rates fell off in what was generally a recession year despite upturn in some indicators in the late months of 1982. The aerospace rate compares with an average of 3.5 percent for all manufacturing corporations. Although aerospace profit rates have traditionally been lower than those of other industries, aerospace actually fared better in 1982 than durable goods producers as a whole; the latter group's rate dropped from 4.3 percent in 1981 to 2.4 percent in 1982.

Measured as a percentage of assets, the aerospace profit was 3.6 percent, down from 5.2 percent in the previous year; as a percentage of equity, it amounted to 11.4 percent, down from 15.9 percent. The comparable 1982 averages for all manufacturing industries were 4.5 percent (assets) and 9.2 percent (equity).

The principal aerospace indicator—profit as a percentage of sales, 3.2 percent—represented the lowest rate since 1975 and it compared with an average of 4.5 percent over the five year span prior to 1982. The sudden dip is attributable largely to the recession and continuing high interest on large scale borrowings, but a contributing factor is the changing mix of government and commercial business. The five-year period 1977-1981 was characterized by high levels of commercial sales, particularly transport aircraft, and commercial sales exceeded government sales for two of the five years. Thus, profit rates were higher in those years because commercial business usually generates greater earnings than government work. A sharp drop in commercial sales in 1982, coupled with a rising level of government sales, helped lower the overall profit rate.

Aerospace plant and equipment expenditures dipped in 1982 to $6 billion, down from $6.4 billion in 1981 and $7 billion in 1980, the latter figure an all-time record. The estimate for 1983, as reported by the Department of Commerce, shows a continued decline, to $5.6 billion. The declines in 1982 and 1983 are consistent with those of U.S. manufacturing industries in general. The aerospace spending reduction in 1982



amounted to 6.1 percent in current dollars; capital expenditures for all manufacturing corporations dropped 5.6 percent and for durable goods manufacturers it was 8.7 percent.

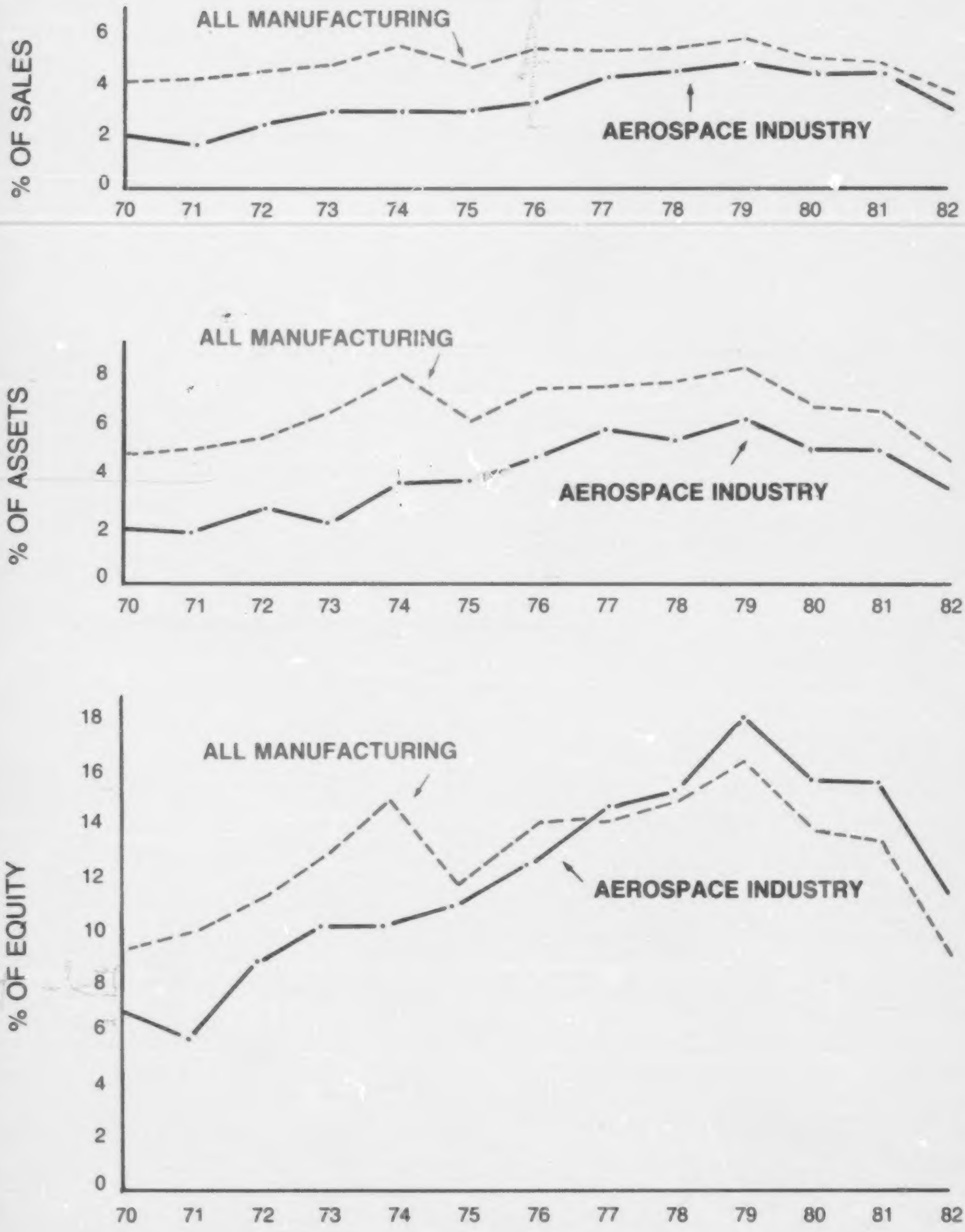
The aerospace balance sheet for 1982 showed increases in total assets—up $3.6 billion to $62.8 billion—and in net worth—up $655 million to $19.7 billion. Net working capital declined from approximately $9 billion in 1981 to $7.6 billion in 1982.

In terms of contract dollar value, General Dynamics Corporation replaced McDonnell Douglas Corporation at the top of the list of companies awarded Department of Defense contracts during Fiscal Year 1982. General Dynamics had contracts worth $5.9 billion; McDonnell Douglas placed second with $5.6 billion, followed by United Technologies Corporation at $4.2 billion. Rounding out the top 10 were General Electric Company ($3.7 billion), Lockheed Corporation ($3.5 billion), The Boeing Company ($3.2 billion), Hughes Aircraft Company ($3.1 billion), Rockwell International Corporation ($2.7 billion), Raytheon Company ($2.3 billion) and Martin Marietta Corporation ($2 billion). With the exception of Rockwell and Martin Marietta, all were in the top 10 in the preceding year.

Data reported by the Department of Defense on prime contract awards over $10,000 show that aircraft accounted for $23.3 billion (20 percent) of the total of $116.7 billion awarded during FY 1982. Missiles and space systems accounted for $14.3 billion (12 percent), and electronics and communications equipment $16.1 billion (14 percent). The West North Central Region accounted for the largest share (21 percent) of aircraft-related contracts, followed by New England (18 percent) and the Pacific Region (17 percent). Companies in the Pacific Region led all others in value of contracts awarded for missiles and space systems, and for electronics and communications equipment.

Rockwell International Corporation headed the list of NASA's leading FY 1982 contractors, as it has every year since the start of the Space Shuttle program; the Rockwell total was $1.6 billion. Others in the top 10 were Martin Marietta Corporation ($310 million), McDonnell Douglas Corporation ($220 million), Morton Thiokol Corporation ($152 million), Computer Sciences Corporation ($138 million), United Space Boosters Inc. ($127 million), General Dynamics Corporation ($114 million), Bendix Corporation ($109 million), I.B.M. Corporation ($107 million), and General Electric Company ($97 million).

NET PROFIT AFTER TAXES



Source: Aerospace Industries Association

NET PROFIT AFTER TAXES AS A PERCENT OF SALES, ASSETS, AND EQUITY FOR ALL MANUFACTURING CORPORATIONS AND THE AEROSPACE INDUSTRY

Calendar Years 1970-1982

AS A PERCENT OF SALES

Year	All Manufacturing Corporations	Non-Durable Goods	Durable Goods	Aerospace[a] Industry
1970	4.0%	4.5%	3.6%	2.0%
1971	4.1	4.5	3.8	1.8
1972	4.4	4.6	4.3	2.4
1973	4.7	5.0	4.5	2.9
1974	5.5	6.4	4.7	2.9
1975	4.6	5.1	4.1	2.9
1976	5.4	5.5	5.2	3.4
1977	5.3	5.3	5.3	4.2
1978	5.4	5.4	5.5	4.4
1979	5.7	6.1	5.2	5.0
1980	4.8	5.6	4.0	4.3
1981	4.7	5.1[r]	4.3[r]	4.4[r]
1982	3.5	4.4	2.4	3.2

AS A PERCENT OF ASSETS[b] AND EQUITY[b]

Year	All Manufacturing Corporations		Aerospace Industry[a]	
	Percent of Assets	Percent of Equity	Percent of Assets	Percent of Equity
1970	4.9%	9.3%	2.2%	6.8%
1971	5.1	9.7	2.0	5.8
1972	5.5	11.1	2.7	8.6
1973	6.5	12.8	2.4	10.3
1974	8.0	14.9	3.7	10.4
1975	6.2	11.6	3.8	11.0
1976	7.5	14.0	4.7	12.8
1977	7.6	14.2	5.7	14.9
1978	7.8	15.0	5.5	15.7
1979	8.4	16.5	6.3	18.4
1980	6.9	13.9	5.2	16.0
1981	6.7	13.6	5.2[r]	15.9[r]
1982	4.5	9.2	3.6	11.4

Source: Bureau of the Census and Federal Trade Commission, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

[a] Based on a sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

[b] Average of four quarters.

[r] Revised.

INCOME STATEMENT FOR AEROSPACE COMPANIES

Calendar Years 1978-1982
(Millions of Dollars)

	1978	1979	1980	1981[r]	1982
Net Sales	$41,689	$51,801	$60,638	$67,519	$69,126
Income from Operations	3,023	3,606	3,659	3,754	3,209
Total Income before Income Taxes	2,726	3,711	3,647	4,665	3,327
Provision for Federal Income Taxes	1,154	1,489	1,341	1,699	1,091
As a Percent of Total Income	42.3%	40.1%	36.8%	36.4%	32.8%
Net Profit after Taxes	1,816	2,614	2,588	2,966	2,238
As a Percent of Net Sales	4.4%	5.0%	4.3%	4.4%	3.2%
Net Profit Retained in Business	1,255	1,897	1,790	2,068	1,361

Source: Bureau of the Census and Federal Trade Commission, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

NOTE: Baed on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles, and parts.

r Revised

BALANCE SHEET FOR AEROSPACE COMPANIES[a]

December 31, 1978-1982
(Millions of Dollars)

	1978	1979	1980	1981[r]	1982
Assets:					
Current Assets					
Cash[b]	$ 2,696	$ 3,001	$ 562	$ 1,056	$ 968
U.S. Government Securities	119	79	2,250	2,876	1,374
Other Securities/Com'l Paper[b]	1,077	564			
Total Cash and U.S. Government Securities	$ 3,894	$ 3,645	$ 2,812	$ 3,932	$ 2,342
Receivables (Total)	4,475	5,237	5,991	5,979	6,699
Inventories (Gross)	15,968	20,491	26,497	30,011	31,563
Other Current Assests	840	844	834	870	735
Total Current Assests	$25,195	$30,217	$36,135	$40,792	$41,340
Net Plant, Property & Equipment	5,639	7,261	9,368	10,952	12,721
Other Non-Current Assets	5,144	7,041	6,935	7,445	8,727
Total Assets	$35,978	$44,518	$52,437	$59,190	$62,787
Liabilities:					
Current Liabilities					
Short Term Loans	$ 171	$ 698	$ 1,198	$ 1,702	$ 1,538
Advances by U.S. Gov't.	5,400	6,554	(c)	(c)	(c)
Trade Accts. & Notes Payable	3,296	4,266	5,095	5,213	5,978
Income Taxes Accrued	2,088	2,742	2,769	2,538	2,786
Installments Due on Long Term Debts	249	272	178	279	483
Other Current Liabilities	7,940	9,342	19,589	22,092	22,910
Total Current Liabilities	$19,144	$23,873	$28,830	$31,825	$33,695
Long Term Debt	3,637	3,975	4,525	5,383	6,454
Other Non-Current Liabilities	1,016	1,356	2,123	2,930	2,930
Total Liabilities	$23,798	$29,204	$35,478	$40,137	$43,079
Stockholders' Equity:					
Capital Stock	$ 3,864	$ 5,013	$ 5,072	$ 5,491	$ 4,967
Retained Earnings	8,315	10,301	11,888	13,561	14,741
Total Net Worth	$12,180	$15,315	$16,959	$19,053	$19,708
Total Liabilities & Stockholders' Equity	$35,978	$44,518	$52,437	$59,190	$62,787
Net Working Capital	$ 6,051	$ 6,344	$ 7,304	$ 8,967	$ 7,644

Source: Bureau of the Census and Federal Trade Commission, "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations."

NOTE: Detail may not add to totals because of rounding.

[a] Based on sample of corporate entities classified in SIC codes 372 and 376, having as their principal activity the manufacture of aircraft, guided missiles, space vehicles and parts.

[b] Effective 1980, deposits outside U.S. included in "Other Securities & Commercial Paper;" they previously were included in "Cash" (on hand and in banks).

[c] Included in "Other Current Liabilities."

[r] Revised.

NEW PLANT AND EQUIPMENT EXPENDITURES

Calendar Years 1960-1983
(Billions of Dollars)

Year	Total Nonfarm Business	All Manufacturing Industries	Durable Goods	Aerospace	
				Current Dollars	Constant Dollars 1972 = 100
1960	$ 48.63	$ 16.36	$ 8.28	$0.34	$0.49
1961	47.82	15.53	7.43	0.30	0.43
1962	51.28	16.03	7.81	0.40	0.57
1963	53.25	17.27	8.64	0.44	0.61
1964	61.66	21.23	10.98	0.41	0.56
1965	70.43	25.41	13.49	0.53	0.71
1966	82.22	31.37	17.23	1.17	1.52
1967	83.42	32.25	17.83	1.25	1.58
1968	88.45	32.34	17.93	1.23	1.49
1969	99.52	36.27	19.97	1.29	1.49
1970	105.61	36.99	19.80	0.88	0.96
1971	108.53	33.60	16.78	0.63	0.66
1972	120.25	35.42	18.22	0.68	0.68
1973	137.70	42.37	22.75	0.87	0.82
1974	156.98	53.21	27.44	1.51	1.31
1975	157.71	54.92	26.33	1.68	1.34
1976	171.45	59.95	28.47	1.69	1.28
1977	198.08	69.22	34.04	2.01	1.44
1978	231.24	79.72	40.43	3.22	2.14[r]
1979	270.46	98.68	51.07	5.27	3.22[r]
1980	295.63	115.81	58.91	7.03	3.94[r]
1981	321.49	126.79	61.84	6.43	3.29[r]
1982	316.43	119.68	56.44	6.04	2.91
1983[E]	310.92	115.90	54.22	5.55	2.54

Source: U.S. Department of Commerce, Bureau of Economic Analysis, Quarterly Report. Aerospace constant dollars based on GNP implicit price deflator.

E Estimate.

r Revised.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION MAJOR CONTRACTORS

Fiscal Years 1978-1982
By rank according to net value of NASA prime contracts awarded during last fiscal year
(Millions of Dollars)

Company	1978	1979	1980	1981	1982
TOTAL PROCUREMENTS	$3,660	$4,212	$4,843	$5,408	$5,884
Awards to Business Firms	2,954	3,417	3,868	4,273	4,806
Percent of TOTAL PROCUREMENTS	81%	81%	80%	79%	82%
Rockwell International Corp.	$ 890	$1,072	$1,273	$1,471	$1,564
Martin Marietta Corp.	145	178	233	261	310
McDonnell Douglas Corp.	140	114	160	198	220
Morton Thiokol Inc.	68	78	79	105	152
Computer Sciences Corp.	66	93	112	129	138
United Space Boosters Inc.	18	33	43	65	127
General Dynamics Corp.	64	47	46	66	114
Bendix Corp.	95	100	97	103	109
I.B.M. Corp.	73	93	84	95	107
General Electric Co.	69	121	114	104	97
United Technologies Corp.	51	73	75	71	90
Lockheed Engrg. & Mgmt. Co. Inc.	75	51	59	61	89
Boeing Services International	43	58	59	81	82
Ford Aerospace & Communications	30	35	48	62	74
Lockheed Missiles & Space Co. ..	21	36	47	43	69
Planning Research Corp.	29	35	38	44	55
Perkin Elmer Corp.	17	31	43	51	44
TRW Inc.	20	29	42	37	44
Boeing Co.	43	43	45	40	41
Hughes Aircraft Co.	73	71	68	53	40
Pan American World Services	12	27	32	34	35
Singer Co.	20	27	28	30	33
Space Communications Co.	(a)	(a)	(a)	3	30
Teledyne Industries Inc.	9	13	20	23	29
Ball Corp.	18	22	21	30	26
Sperry Corp.	26	20	18	24	26
Northrop Services Inc.	16	20	22	24	25
Air Products & Chemicals Inc.	23	19	17	26	25
RCA Corp.	53	51	32	27	24
Raytheon Service Co.	10	9	13	15	20

Source: National Aeronautics and Space Administration, "NASA Annual Procurement Report," (Annually).

a Not in list of major contractors for indicated years.

DEPARTMENT OF DEFENSE MAJOR CONTRACTORS

Fiscal Years 1978-1982
Listed by rank according to net value of prime contracts awarded during last fiscal year[a]
(Millions of Dollars)

Company	1978	1979	1980	1981	1982
TOTAL CONTRACTS	$59,582	$63,252	$76,807	$97,389	$116,660
General Dynamics Corp.	$4,154	$3,492	$3,518	$3,402	$5,891
McDonnell Douglas Corp.	2,863	3,229	3,247	4,409	5,630
United Technologies Corp.	2,400	2,554	3,109	3,776	4,208
General Electric Co.	1,786	2,042	2,202	3,018	3,654
Lockheed Corp.	2,226	1,797	2,037	2,657	3,499
Boeing Co.	1,525	1,515	2,385	2,683	3,239
Hughes Aircraft Co.	1,489	1,557	1,819	2,552	3,141
Rockwell International Corp.	890	684	969	1,126	2,691
Raytheon Co.	1,307	1,249	1,745	1,826	2,262
Martin Marietta Corp.	539	519	809	1,287	2,008
Grumman Corp.	1,180	1,364	1,322	1,710	1,900
Northrop Corp.	586	800	1,227	623	1,598
Westinghouse Electric Corp.	539	660	932	1,125	1,492
FMC Corp.	361	352	835	1,052	1,371
Litton Industries Inc.	1,557	832	652	1,385	1,317
Honeywell Inc.	545	658	687	838	1,217
IBM Corp.	396	553	497	805	1,197
Sperry Corp.	612	778	845	928	1,149
RCA Corp.	565	487	589	877	996
Ford Motor Corp.	406	338	396	544	897
TRW Inc.	325	436	508	517	869
Tenneco Inc.	407	1,093	1,524	1,151	845
Exxon Corp.	311	341	480	1,152	841
Texas Instruments Inc.	434	374	431	625	839
American Telephone & Telegraph Co.	457	570	597	695	753
General Motors Corp.	420	449	509	622	690
Congoleum Corp.	282	336	378	383	676
AVCO Corp.	124	138	287	493	668
Motor Oil Hellas	(*b*)	184	1,059	583	633
General Tire & Rubber Co.	213	220	310	322	625

Source: Department of Defense, "100 Companies Receiving the Largest Dollar Volume of Prime Contract Awards," (Annually).

a Effective 1980, data include DOD contract awards for civil functions, while data for prior years were limited to military prime contract awards.

b Not in top 100 companies for the listed year.

DEPARTMENT OF DEFENSE PRIME CONTRACT AWARDS OVER $10,000[a] FOR SELECTED MAJOR MILITARY HARD GOODS

By Geographic Region
Fiscal Years 1980, 1981, 1982

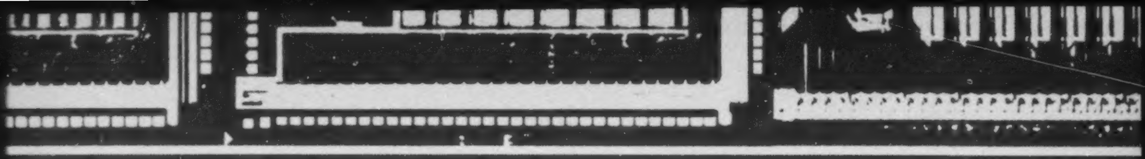
Program and Region	Millions of Dollars			Percent of Program Total		
	1980	1981	1982	1980	1981	1982
AIRCRAFT—TOTAL	$15,142	$19,021	$23,326	100.0%	100.0%	100.0%
New England	3,812	4,204	4,216	25.2	22.1	18.1
Middle Atlantic	2,241	2,825	3,012	14.8	14.9	12.9
East North Central	1,034	1,362	1,787	6.8	7.2	7.7
West North Central	2,551	3,562	4,815	16.8	18.7	20.6
South Atlantic	868	2,102	2,649	5.7	11.1	11.4
East South Central	169	181	194	1.1	1.0	0.8
West South Central	2,755	2,484	2,227	18.2	13.1	9.5
Mountain	146	192	407	1.0	1.0	1.7
Pacific[b]	1,566	2,108	4,018	10.3	11.1	17.2
MISSILE & SPACE SYSTEMS—TOTAL	$ 9,321	$11,474	$14,271	100.0%	100.0%	100.0%
New England	1,219	1,715	1,861	13.1	14.9	13.0
Middle Atlantic	596	768	804	6.4	6.7	5.6
East North Central	154	197	311	1.7	1.7	2.2
West North Central	694	703	802	7.4	6.1	5.6
South Atlantic	772	916	1,557	8.3	8.0	10.9
East South Central	145	156	168	1.6	1.4	1.2
West South Central	273	404	781	2.9	3.5	5.5
Mountain	572	1,208	1,433	6.1	10.5	10.0
Pacific[b]	4,895	5,406	6,554	52.5	47.1	45.9
ELECTRONICS & COMMUNICATIONS EQUIPMENT—TOTAL	$10,619	$12,871	$16,125	100.0%	100.0%	100.0%
New England	1,086	1,231	1,938	10.2	9.6	12.0
Middle Atlantic	1,936	2,255	3,009	18.2	17.5	18.7
East North Central	686	878	851	6.5	6.8	5.3
West North Central	879	1,004	829	8.3	7.8	5.1
South Atlantic	1,800	2,452	2,876	17.0	19.0	17.8
East South Central	58	71	90	0.5	0.5	0.6
West South Central	581	858	933	5.5	6.7	5.8
Mountain	371	438	524	3.5	3.4	3.2
Pacific[b]	3,222	3,685	5,076	30.3	28.6	31.5

Source: Department of Defense, "Prime Contract Awards by Region and State" (Annually).

NOTE: Detail may not add to totals because of rounding.

[a] Effective 1980, data include DOD contract awards for civil functions, while data for prior years were limited to military prime contract awards.

[b] Includes Alaska and Hawaii.



GLOSSARY

Accessions: see **Labor Turnover.**

Aeronautics: the science that treats of the operation of aircraft, also, the art or science of operating aircraft.

AIA: Aerospace Industries Association of America, Inc., formerly Aircraft Industries Association.

Aerospace Industry: the industry engaged in research, development and manufacture of aerospace systems, including manned and unmanned aircraft; missiles, space launch vehicles, and spacecraft; propulsion, guidance and control units for all of the foregoing; and a variety of airborne and ground based equipment essential to the test, operation, and maintenance of flight vehicles.

Aerospace Employment: annual average calculated as one-twelfth of sum of monthly estimates of total number of persons employed during a designated pay period by the aircraft and missile and space industries (SIC 372 and 376) plus estimated aerospace-related employment in the communications equipment (SIC 3662) and instruments (SIC 381 and 382) industries and in certain other industries (SIC 28, 35, 73, 89, etc.).

Aerospace Payroll: estimated on the basis of average weekly earnings for a given calendar year for production workers plus an estimated annual salary for other employees.

Aerospace Sales: the AIA estimate of aerospace industry sales, developed by summing the (1) DOD expenditures for procurement of aircraft and missiles; (2) estimates of DOD expenditures for RDT&E of aircraft and missiles; (3) NASA expenditures for research and development; (4) outlays for space activities by DOD and other U.S. Government departments and agencies; (5) net sales of aerospace products to other than U.S. Government, including civil aircraft products (domestic sales and exports), commercial sales of space-related equipment, and exports of missiles and military aircraft (both commercial and FMS); and (6) non-aerospace sales of major aerospace companies.

Air Carriers: the commercial system of air transportation, consisting of domestic and international scheduled and charter service.

Aircraft: all airborne vehicles supported either by buoyancy or by dynamic action. Used in this volume in a restricted sense to mean an airplane—any winged aircraft, including helicopters but excluding gliders and guided missiles.

Aircraft Agreement (Agreement on Trade in Civil Aircraft): negotiated in the Tokyo Round of the Multilateral Trade Negotiations, and implemented January 1, 1980, providing for elimination of tariff and non-tariff trade barriers in the civil aircraft sector.

Aircraft Industry: the industry primarily engaged in the manufacture of aircraft, aircraft engines and parts, aircraft propellers and parts, and aircraft parts and auxiliary equipment. A sector of the **Aerospace Industry.**

Airframe: the structural components of an airplane, such as fuselage, empennage, wings, landing gear, and engine mounts, but excluding such items as engines, accessories, electronics and other parts that may be replaced from time to time.

Airlines: see **Air Carriers.**

Appropriation (Federal Budget): an act of Congress authorizing an agency to incur obligations and make payments out of funds held by the Department of the Treasury.

Assets, Net: the sum of all recorded assets after reducing such amount by allowance of reserve for bad debts, depreciation and amortization, but before deducting any liabilities, mortgages or other indebtedness.

Astronautics: the art and science of designing, building and operating manned or unmanned space objects.

Average Weekly Hours: average hours for which pay was received; different from standard or scheduled hours.

Backlog: the sales value of orders accepted (supported by legal documents) that have not yet passed through the sales account.

Budget Authority: authority provided by the Congress; mainly in the form of **Appropriations,** which allows Federal agencies to incur obligations to spend or lend money.

Bureau of the Census: an agency of the Department of Commerce.

Bureau of Economic Analysis (BEA): an agency of the Department of Commerce.

Bureau of Labor Statistics (BLS): an agency of the Department of Labor.

Constant Dollars, see **Deflator.**

Deflator: index used to convert a price level to one comparable with the price level at a different time, offsetting the effect of inflation. The base period, which equals 100, is usually specified as either a given fiscal or calendar year. **Constant Dollars** are calculated by dividing current ('then-year') dollars by appropriate price deflator, and multiplying by 100.

Depreciation: the general conversion of the depreciable cost of a fixed asset into expense, spread over its remaining life. There are a number of methods, all based on a periodic charge to an expense account and a corresponding credit to a reserve account.

Development: the process or activity of working out a basic design, idea or piece of equipment (see **Research).**

DOD: Department of Defense.

DOE: Department of Energy.

DOT: Department of Transportation.

Durable Goods Industry: comprised of major manufacturing industry groups with SIC Codes 24, 25, and 32-39. All major manufacturing industry groups in SIC Codes 20-23 and 26-31 are considered nondurable goods manufacturing industry groups.

Earnings: the actual return to the worker for a stated period of time. Irregular bonuses, retroactive items, payments of various welfare benefits, and payroll taxes paid by employers are excluded.

Average Hourly Earnings: on a "gross" basis, reflecting not only changes in basic hourly and incentive wage rates, but also such variable factors as premium pay for overtime and late shift work, and changes in output of workers paid for an incentive plan.

Average Weekly Earnings: derived by multiplying average weekly hours by hourly earnings.

ERDA: Energy, Research and Development Administration. ERDA was formed in 1974 to bring together activities previously scattered among several agencies. The major elements covered were nuclear energy, fossil energy, solar and geothermal energy, conservation through increased efficiency and environmental controls. Most of these functions were assumed by the Department of Energy as of October 1, 1977.

Establishment: the basis for reporting to the Census of Manufacturers; an operating facility in a single location.

Evaluation: (Department of Defense): determination of technical suitability of material, equipment or a system; see **RDT&E.**

Expenditures (Federal Budget): see **Outlays.**

Exports: domestic merchandise including commodities which are grown, produced, or manufactured in the United States, and commodities of foreign origin which have been changed in the United States from the form in which they were imported, or which have been enhanced in value by further manufacture in the United States, and which are traded or sold to other nations.

FAA: Federal Aviation Administration (formerly the Federal Aviation Agency), an agency of the Department of Transportation.

Facility: a physical plant or installation including real property, building, structures, improvements and plant equipment.

Fiscal Year (Federal Budget): until June 30, 1976, year beginning July 1 and ending June 30, and designated by the year in which it ends. Beginning October 1, 1976, the fiscal years run from October 1 through September 30 and are designated by the year in which they end. A three month **Transition Quarter** from July 1 through September 30, 1976, belongs to neither fiscal year.

Flyaway Value: includes the cost of the airframe, engines, electronics, communications, armament and other installed equipment.

Foreign Military Sales (FMS): export sales to foreign governments arranged through the Department of Defense, whereby DOD recovers full purchase price and administrative costs; often mistakenly used to include foreign military aid and foreign commercial sales as well.

FY: see **Fiscal Year.**

General Agreement on Tariff and Trade (GATT): a multilateral treaty, subscribed to by over 80 governments which together account for more than four-fifths of world trade; its aim is to liberalize world trade; the only multilateral instrument that lays down agreed rules for international trade.

General Aviation: all civil flying except that of air carriers.

GNP (Gross National Product): the market value of the total output of goods and services produced by the nation's economy before deduction of depreciation charges and other allowances for business and institutional consumption of durable goods. It includes the purchase of goods and services by consumers and government, gross private domestic investment and net exports.

Helicopter: a rotary-wing aircraft which depends principally for its support and motion in the air upon the lift generated by one or more power-driven rotors, rotating on substantially vertical axes. A helicopter is a V/STOL.

Heliport: an area, either at ground level or elevated on a structure, that is used for the landing and take-off of **helicopters** and includes some or all of the various facilities useful to helicopter operations such as helicopter parking, hangar, waiting room, fueling and maintenance equipment.

Helistop: a minimum facility **heliport,** either at ground level or elevated on a structure for the landing and takeoff of **helicopters** but without such auxiliary facilities as waiting room, hangar parking, etc.

ICBM: Intercontinental Ballistic Missile, with a range of more than 5,000 miles.

Imports: classified as "general imports" or "imports for consumption." This volume refers generally to "imports for consumption," which are entries for immediate consumption plus merchandise withdrawn from bonded storage warehouses for consumption. Data are compiled from Import Entries filed with U.S. Customs officials, and are in general based on the market value or price in the foreign country at the time of exportation of such merchandise, including the cost of containers and coverings, as well as other charges and expenses incidental to placing the merchandise in condition, packed and ready for shipment to the United States, but excluding import duties, insurance, freight and other charges incidental to arrival of the goods in the United States. The foreign values of imported merchandise are converted into U.S. currency at the rate of exchange prevailing on the day the merchandise is shipped to the United States.

Income:

Net Operating Income: total net sales (see **Sales**) less total operating costs.

Net Income (Before Income Taxes): **Net Operating Income** plus or minus **"Other Income and Expenses."**

Other Income and Expenses: includes interest income, royalty income, capital gains and losses, interest expense, cash discounts, etc.

Net Income (After Income Taxes): **Net Income (Before Taxes)** less federal income taxes.

Labor Turnover: the gross movement of wage and salary workers into and out of employed status with respect to individual establishments. This movement is divided into two broad types: **Accessions** and **Separations.** Each type of action is accumulated for a calendar month or year and expressed as a rate per 100 employees. The data relate to all employees, full- or part-time, permanent or temporary.

Accessions: the total number of permanent and temporary additions to the employment roll, including both new and rehired employees.

Separations: terminations of employment, classified according to cause: quits, layoffs, and other separations.

Man-Hours: in measuring labor input, takes into account both the number of production workers and their actual hours of work. The Bureau of Labor Statistics covers all hours paid for, whether worked or not, when the employee was at the plant. One man-hour means one hour of a person's time.

Manufacturing Industries: those **establishments** engaged in the mechanical or chemical transformation of inorganic or organic substances into new products, and usually described as plants, factories, or mills, which characteristically use power-driven machines and materials-handling equipment; also establishments engaged in assembling component parts of manufactured products if the new product is neither a structure nor other fixed improvement.

Merchandise Trade Balance: the difference between the value of U.S. goods exported to other countries and foreign goods imported into this country. The trade balance is generally regarded as "favorable" when **exports** exceed **imports**—a trade surplus—and "unfavorable" when **imports** exceed **exports**—a trade deficit.

Missile: sometimes applied to space launch vehicles, but more properly connotes automated weapons of warfare, *i.e.*, a weapon which has an integral system of guidance, as opposed to the unguided rocket.

Multilateral Trade Negotiations (MTN): a forum within the **GATT** in which countries negotiate to overcome their trade problems. In September 1973, in Tokyo, over 100 nations launched new multilateral trade negotiations, called the "Tokyo Round," covering both tariff and non-tariff barriers to trade in industrial and agricultural products, and improvements in the **GATT** itself.

NASA: National Aeronautics and Space Administration.

NATO: North Atlantic Treaty Organization.

New Obligational Authority (Federal Budget): see **Budget Authority.**

Non-Aerospace Products and Services: products and services other than aircraft, missiles, space vehicles, and related propulsion and parts, produced or performed by establishments whose principal business is the development and/or manufacture of aerospace products.

OASD: Office of the Assistant Secretary of Defense.

Obligations (Federal Budget): commitments made by Federal agencies to pay out money for products, services or other purposes—as distinct from the actual payments. Obligations incurred may not be larger than **budget authority.**

Other Aerospace Products and Services: all conversions, modifications, site activation, and other aerospace products (including drones) and services, plus research and development under contract, defined as basic and applied research in the sciences and in engineering, and design and development of prototype products and processes.

Outlays: checks issued, interest accrued on the public debt, or other payments made, net of refunds and reimbursements.

Overtime Hours: that portion of the gross average weekly hours which was in excess of regular hours and for which premium payments were made.

Payroll: includes the gross earning paid in the calendar year to all employees on the payroll of operating manufacturing **establishments.** Includes all forms of compensation paid directly to workers such as salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. Does not include employers' Social Security contributions or other non payroll labor costs such as employees' pension plans, group insurance premiums, and workmen's compensation.

Passenger-Mile: one passenger moved one mile.

Procurement: the process whereby the executive agencies of the Federal Government acquire goods and services from enterprises other than the Federal Government.

Production Workers: includes working foremen and all non-supervisory workers (including leadmen and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, janitorial services, product development, auxiliary production for plant's own use and record keeping and services closely associated with the above production operations.

R&D: Research and Development.

Research: systematic study directed toward fuller scientific knowledge or understanding of the subject studied. Research is classified as either **basic** or **applied** according to the objectives of the sponsoring agency.

Basic Research: with the objective of gaining fuller knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications toward processes or products in mind.

Applied Research: with the objective of gaining knowledge or understanding necessary for determining the means by which a recognized and specific need may be met.

Development: the systematic use of scientific knowledge directed toward the production of useful materials, devices, systems, or methods including design and development of prototype and processes.

Independent Research and Development (IR&D): a term devised by the Department of Defense and used by

Federal agencies to differentiate between a contractor's research and development technical effort performed under a contract, grant, or other arrangement (R&D) and that which is self-initiated and self-funded (IR&D).

Industrial Research and Development: research and development work performed within company facilities, funded by company or Federal funds, and excluding company-financed research and development contracted to outside organizations such as research institutions, universities and colleges, or other non-profit organizations.

RDT&E (Department of Defense): Research, Development, Test and Evaluation.

Research: see **R&D.**

Rotorcraft: an aircraft which in all its usual flight attitudes is supported in the air wholly or in part by a rotor or rotors, *i.e.*, airfoils rotating or revolving about an axis (see **Helicopter).**

Sales: net of returns, allowances, and discounts, the dollar value of shipments, including dealer's commission, if any, which have passed through the sales account.

Satellite: a body that revolves around a larger body, such as the moon revolving around the earth, or a manmade object revolving about any body such as the sun, earth, or moon.

Separation: see **Labor Turnover.**

SIC (Standard Industrial Classification): a system developed by the U.S. Government to define the industrial composition of the economy, facilitating comparability of statistics. See **Aerospace Industry** for explanation of SIC codes applicable to the aerospace industry.

Space Vehicle: an artificial body operating in outer space (beyond the earth's atmosphere).

Stockholder's Equity: assets minus all obligations of the corporation, except those to stockholders. Annual data are average equity for the year (using four end-of-quarter figures.) For details, see "Quarterly Financial Report for Manufacturing, Mining and Trade Corporations," compiled by the Bureau of the Census.

STOL: short take-off and landing aircraft.

Test (Department of Defense): an experiment designed to assess progress in attainment or accomplishment of development objectives (see **RDT&E).**

Thrust: the driving force exerted by an engine, particularly an aircraft or missile engine, in propelling the vehicle to which it is attached.

Ton-Mile: one ton moved one mile.

Total Obligational Authority: the sum of **budget authority** granted or requested from the Congress in a given year, plus unused **budget authority** from prior years.

Trade Balance: see **Merchandise Trade Balance.**

Transition Quarter (Tr. Qtr.): the three-month interval from July 1, 1976 to September 30, 1976. See **Fiscal Year.**

Turbine, Turbo: a mechanical device or engine that spins in reaction to a fluid flow that passes through or over it. Frequently used in "turboprop" or "turbojet."

U.K.: United Kingdom.

U.S.: United States of America.

USA: United States Army, an agency of the U.S. Department of Defense.

USAF: United States Air Force, an agency of the U.S. Department of Defense.

USN: United States Navy, an agency of the U.S. Department of Defense.

USSR: Union of Soviet Socialist Republics.

Utility Aircraft: an aircraft designed for general purpose flying.

V/STOL: vertical short take-off and/or landing aircraft.

Wages: the payroll of production and related workers (see **Payroll).**

INDEX

—A—

ACCESSIONS, 147

ACTIVE CIVIL AIRCRAFT, 94-98

AERONAUTICS, 114

AEROSPACE INDUSTRY,
  Average Earnings, 144
  Backlog, 17
  Balance of Trade, 124-125
  Balance Sheet, 157
  Comparison with All Manufacturing and Durable Goods, 18, 19, 140, 141, 154, 155, 158
  Employment, 138-151
  Exports, 125, 128-134, 136-137
  Finance, 152-161
  Imports, 124-127, 131, 132, 134
  Payroll, 141
  Profits, 154-156
  Research and Development, 74-78, 108-121
  Sales, 13-16, 18, 19, 113, 154-156
  SIC Codes, 12, 148

AIR CARGO, 82, 88, 91

AIR CARRIERS, See Airlines

AIR FORCE,
  Aircraft Acceptances, 41, 43
  Aircraft Procurement, 44, 46
  Major Missile Systems, 51-53
  Missile Procurement, 50, 55
  RDT&E, 116, 117, 120, 121

AIR TRANSPORTATION, 80-99
  See also Individual Subjects

AIRCRAFT, 29-47, 83-86, 94-98
  Active Civil, 83-86, 94-98
  Airlines, 80-92, 94-97
  Backlog, 17, 31, 35
  Employment, 138, 139, 142, 143
  Exports, 122-123, 128-133, 136, 137
  Flyaway Cost, Military, 40-43
  Imports, 123, 126, 127, 131, 132
  Military, 15, 29, 33, 40-47, 122, 123, 126, 127, 129, 133
  On Order, 31, 35
  Outlays, DOD, 22, 24, 25, 46
  Prime Contract Awards, 118, 161
  Procurement, DOD, 22, 24, 25, 42-46
  Production, 28-47
  RDT&E, DOD, 24, 114, 117, 118, 121
  Sales, 8, 9, 14-16, 28-30, 32
  Transports, 29, 33-37, 40, 41, 43, 47, 122, 126, 128, 129, 133

AIRLINES,
  Domestic, 80, 86-92, 94-97
  Finances, 80, 86-90
  Flight Equipment, 83-86, 90, 94-97
  Fuel, 86
  Foreign, 82-86
  Helicopters, 85, 86, 95, 97
  Miles Flown, 82, 91, 92
  Passenger Miles, 82, 91, 92
  Traffic, 82, 91
  U.S. Fleet, 94, 95
  World Airline Fleet, 83-86

AIRMAN CERTIFICATES, 99

AIRPORTS, 93

APPLIED RESEARCH AND DEVELOPMENT, 112

ARMY,
  Aircraft Acceptances, 41, 43
  Aircraft Procurement, 44, 46
  Major Missile Systems, 49, 52, 53
  Missile Procurement, 50, 55
  RDT&E, 116, 117, 120, 121

ASSETS,
  Aerospace Industry, 154, 155, 157
  Airlines, 90

ASTRONAUTICS,
  Outlays, 24, 25
  RDT&E, 24, 25, 117

ASTRONAUTS, 66-68

—B—

BACKLOG,
  Aerospace, 17
  Aircraft, 17, 31, 32
  Engines, 17, 31
  Missiles, 17, 56, 57
  Space, 17, 79
  Transport Aircraft, 35, 36

BALANCE OF TRADE, 124, 125

BALANCE SHEET, AEROSPACE COMPANIES, 157

BASIC RESEARCH FUNDS, 112

BOMBERS,
  Exports, 129, 133
  Flyaway Costs, 40
  Production, 40

BUSINESS FLYING, 97, 98, 103-105

—C—

CAPITAL SPENDING, 158

CARGO TON-MILES, 82, 91

CERTIFICATED PILOTS, 99

CIVIL AIRPORTS, 93

COMMERCIAL FLYING, See
  Business Flying

COMMUNICATIONS EQUIPMENT,
  Contract Awards, 118, 161
  Employment, 142

COMMUNICATIONS SATELLITES, 61-63

CONSTANT DOLLARS, 13-17, 19, 30-32, 56, 57, 69, 71, 73, 75, 79, 110, 111, 115, 145, 158, See also Deflators

CONTRACT AWARDS
  DOD, 118, 119, 160, 161
  NASA, 159

—D—

DEFENSE CONTRACTORS, 160

DEFLATORS, 26, 27

DELIVERIES, See Production

DEPARTMENT OF DEFENSE,
  Aerospace Sales, 13, 21-23
  Aircraft,
    Flyaway Cost, 40-43
    Outlays, 22, 24, 25, 46
    Procurement, 24, 25, 44-46
    RDT&E, 24, 25, 117, 118, 121
    Aeronautics, R&D, 114
    Astronautics, 24, 25, 117
  Contractors, 160
  Missiles, 22, 24, 25, 48-57, 129
    Exports, 129
    Outlays, 22, 24, 25, 54, 55
    Procurement, 22, 24, 25, 50, 54, 55
    RDT&E, 24, 25, 117, 118, 120
  Outlays, 20-25, 46, 54, 55
    Aerospace, 21-25
    Aircraft, 22, 24, 25, 46
    Astronautics, 24, 25
    Functional Title, 24, 25
    Missiles, 22, 24, 25, 54
    Personnel, 24, 25
    R&D, 115
    RDT&E, 24, 25
  Personnel, 24, 25
  Prime Contract Awards, 113, 119, 160, 161
  Procurement, 23-25, 44-46, 50, 54, 55
  R&D, 114, 115
  RDT&E, 24, 25, 116-121
  Space Activities, 61-63, 69-73, 77, 78

DEPARTMENT OF ENERGY, 70-73, 115

DEPARTMENT OF TRANSPORTATION,
  Aeronautics R&D, 114

DURABLE GOODS INDUSTRY,
  Employment, 140
  New Plant and Equipment
    Expenditures, 158
  Profits, 155
  Sales, 18, 19

—E—

EARNINGS,
  Companies, 154-156
  Employees, 141, 144, 145

ELECTRONICS,
  Prime Contract Awards, 118, 161
  Employment, 142

EMPLOYMENT, 138-151
  All Manufacturing, 140
  Durable Goods, 140
  NASA, 151
  Scientists and Engineers, R&D, 150

ENGINES,
  Aircraft,
    Backlog, 31
    Exports, 129, 134
    Imports, 126, 134
    Sales, 30
  Missiles and Space Vehicles,
    Backlog, 57
    Exports, 129
    Sales, 57

ERDA, 115

EXPORT-IMPORT BANK, 135-137

EXPORTS, 33, 36, 38, 43, 122-125, 128-137
  Aerospace, 128, 122-125, 128-134, 136-137
  Balance of Trade, 124, 125
  Civil, 33, 124, 128-134
  Engines, 129, 134
  General Aviation, 33, 129, 130, 132
  Helicopters, 33, 43, 129-131, 133
  Military, 33, 43, 128, 129, 133, 134
  Transports, 33, 128-130, 133, 136, 137
  U.S. Exports, 128
  Used Aircraft, 129, 130, 133

—F—

FEDERAL (U.S. GOVERNMENT),
  Aerospace Sales, 13, 16, 21, 22
  Backlog, 17
  Outlays, 20
  Research and Development, 115

FIGHTER AIRCRAFT,
  Exports, 129, 133
  Flyaway Cost, 40-43
  Procurement, 44, 45
  Production, 40-43
  RDT&E, 121

FINANCES,
  Airlines, 86-90
  Government, See Outlays and Federal
  Industry, 152-161

FLYING HOURS, 98

FOREIGN TRADE, 122-133, See also Imports, Exports

FUEL 86

FUNDS, RESEARCH, 111-114

—G—

GEOGRAPHIC DISTRIBUTION,
  Airports, 93
  Civil Helicopter Fleet, 104, 105
  Contract Awards, 119, 161
  Exports, 131-133
  Heliports, 107
  Imports, 131, 132

GENERAL AVIATION,
  Active Civil Aircraft, 96-98
  Exports, 33, 129, 130, 132
  Hours Flown, 98
  Imports, 126, 132
  Shipments, 33, 34, 39

GLIDER PILOTS, 99

GOVERNMENT, See Federal

GROSS NATIONAL PRODUCT, 18-20
  Deflator Series, 26

—H—

HELICOPTERS, 33, 34, 38, 40, 42-45, 47, 85, 86, 95-97, 99, 100-107
  Active Civil, 85, 95-97
  Civil Helicopter Fleet by State, 104, 105
  Designation Chart, 106
  Exports, 33, 38, 129-131, 133
  Flyaway Cost, Military, 40-43
  Imports, 126, 127, 131
  Military, 38, 40-43
  Operators, 103
  Production, 33, 34, 38, 40-43
  U.S. Airlines, 95, 97
  World Civil Airlines, 85, 86

HELIPORTS, 107

HELISTOPS, 107

HOURS FLOWN, GENERAL AVIATION, 98

—I—

ILLNESS RATES, 148

IMPLICIT PRICE DEFLATORS, 26, 27

IMPORTS,
  Aerospace, 125, 126
  Aircraft, 127
  Engines, 134
  General Aviation, 132
  Helicopters, 131

INCOME ACCOUNTS, 156

INDUSTRIAL RESEARCH AND DEVELOPMENT, 111-114

INJURY RATES, 148

INSTRUCTIONAL FLYING, 97, 98

INVESTMENT IN EQUIPMENT
  Aerospace Industry, 158
  Durable Goods Industries, 158
  Manufacturing Industries, 158
  Non-farm Business, 158
  U.S. Airlines, 90

—L—

LABOR TURNOVER RATES, 147

LIABILITIES, Corporate, 157

—M—

MAJOR CONTRACTORS, 159, 160

MANPOWER, See Employment

MANUFACTURING INDUSTRIES,
  Employment, 140
  New Plant and Equipment Expenditures, 158
  Profits, 154, 155
  Payroll, 141
  Sales, 18, 19
  Work Injury and Illnesss Rates, 148

MILES FLOWN, 82, 91, 92

MILITARY EXPORTS, 33, 43, 128, 129, 133, 134

MISSILES, 14-17, 48-57, 117, 118, 120
  Backlog, 17, 56
  Employment, 142, 144-149
  Engines, 57
  Exports, 129
  Major Missile Systems, 51-53
  Outlays, 22, 24, 25, 54, 55
  Prime Contract Awards, 118, 161
  Procurement, 22, 24, 25, 50, 54, 55
  RDT&E, DOD, 24, 25, 117, 118, 120
  Sales, 14-16, 56, 57

—N—

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
  Aeronautics, R&D, 114
  Aerospace Sales, 13
  Budget Authority, 72-76
  Construction of Facilities, 74, 75
  Contractors, 159
  Employment, 151
  Outlays, 21, 22, 69-71, 74, 75
  Research and Development, 74-76, 114, 115
  Research and Program Management, 74, 75

NATIONAL DEFENSE, 20, 21

NAVY,
  Aircraft Acceptances, 42, 43
  Aircraft Flyaway Cost, 42, 43
  Aircraft Procurement, 44-46
  Major Missile Systems, 51-53
  Missile Procurement, 50, 54

—O—

ORDERS, Jet Transports, 35, 36

OUTLAYS,
  Aircraft, 22, 24, 25, 46
  Aerospace, 21-25
  Astronautics, 24
  Federal, 20-22
  Missiles, 22, 24, 25
  National Defense, 20, 21
  RDT&E, 24, 25, 117

OPERATING REVENUE,
  U.S. Airlines, 87, 88

—P—

PASSENGER-MILES, 82, 91, 92

PASSENGERS CARRIED, 82, 91, 92

PAYROLL, 141

PILOTS, 99

PLANES, See Aircraft

PLANT AND EQUIPMENT EXPENDITURES, 158

PRIME CONTRACT AWARDS,
  DOD, 118, 119, 160, 161
  NASA, 159

PROCUREMENT, DOD,
  Aerospace Products and Services, 13, 21-25
  Aircraft, 22, 24, 25, 44-46
  Missiles, 22, 24, 25, 50, 54, 55
  Total, 24, 25

PRODUCTION, Aircraft, 28-47
  General Aviation Aircraft, 33, 34, 39
  Helicopters, 33, 34, 38, 40-43
  Military Aircraft, 33, 40-43
  Transport Aircraft, 33-37

PROFITS, 154-156

—R—

RDT&E, See Research, Development, Test and Evaluation

RESEARCH, Applied and Basic, 112

RESEARCH AND DEVELOPMENT, 74, 75, 77, 108-121
  Aeronautics, 114
  DOD, 114, 121
  DOT, 114
  Energy, 113, 115
  Federal Funds, 110-114
  Industrial, 110-114
  NASA, 74, 75, 114, 115
  Scientists and Engineers, 150

RESEARCH AND PROGRAM MANAGEMENT, NASA, 74, 75

RESEARCH, DEVELOPMENT, TEST & EVALUATION, DOD
  Aircraft, 24, 25, 117, 118, 121
  Astronautics, 24, 25, 117
  By Agency, 116, 117, 121
  Contract Awards, 118, 119
  Missiles, 24, 25, 117, 118, 120
  Outlays, 24, 25, 117
  Space, 78
  Total, 24, 25, 117

ROCKETS, See Missiles

ROTARY WING, See Helicopters

- ROTORCRAFT, See Helicopters

—S—

- SALES,
  - Aerospace, 13-16, 18, 19
    - And National Economy, 18, 19
    - By Customer, 13, 16
    - By Product, 14-16
  - Aircraft, 14-16, 31
  - Constant Dollars, 13-16, 19
  - Durable Goods, 18, 19
  - Manufacturing Industries, 18, 19
  - Missiles, 14-16, 56
  - Non-Aerospace, 14-16
  - Space, 14-16, 79
- SCIENTISTS AND ENGINEERS, 150
- SEPARATIONS, 147
- SIC Codes, 12, 148
- SPACE, 14-17, 58-79
  - Backlog, 17, 79
  - DOD, 61-63, 69-73, 77, 78
  - Employment, 142, 144-148
  - Launchings, 60-63
  - Manned Space Flights, 66-68
  - NASA, 61-63, 69-76
  - Procurement, 78
  - Programs, 76-78
  - RDT&E, 78
  - Sales, 14-16, 79
  - Satellites, 61-63
  - Space Launch Vehicles, 64-65
  - Spacecraft Record, 60
- STANDARD INDUSTRIAL CLASSIFICATION, 12, 148
- STOCKHOLDERS' EQUITY, 157
- STRIKES, 149
- STUDENT PILOTS, 99

—T—

- TAXES, 156
- TRADE BALANCE, 124, 125
- TRANSPORTATION,
  - Air, 81-99
  - Helicopter, 100-107
  - See Also Individual Subjects
- TRANSPORTS,
  - Civil, 33-37, 126-130, 133, 136, 137
    - Exports, 33, 36, 43, 128-130, 133, 136, 137
    - Imports, 126, 127
    - Military, 40-43, 47
    - On Order, 35, 36, 37
    - Production, 33-37, 40-43
    - Specifications, 37, 47
    - TURBOJET AIRCRAFT, 83, 86, 94, 97
    - TURBOPROP AIRCRAFT, 83-86, 94, 95, 97
- TURNOVER, LABOR, 147

—U—

- USED AIRCRAFT,
  - Civil Imports, 126, 127
  - Civil Exports, 129, 130
  - Military Exports, 129, 133
- USED AIRCRAFT ENGINES,
  - Exports, 134
- USAF, See Air Force
- U.S. AIRLINES
  - Assets, 90
  - Finances, 86-90
  - Fleet, 94-97
  - Net Investment, 90
  - Operating Expenses, 86, 87, 89
  - Operating Revenues, 87, 88
  - Traffic, 91, 92
- USN, See Navy
- UTILITY AIRCRAFT, See General Aviation

—V—

- VERTICAL LIFT AIRCRAFT, See Helicopters

—W—

- WAGES, 144, 145
- WORKING CAPITAL 157
- WORK ILLNESS AND INJURY RATES, 148
- WORK STOPPAGES, 149
- WORLD AIRLINES,
  - Fleet, 83-86
  - Traffic, 82

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